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**DIABETES IN KUWAIT – CURRENT PATIENTS’
EXPERIENCES OF THEIR MEDICAL TREATMENT(S)
WITH EMPHASIS ON RENAL COMPLICATIONS AS
COMPARED WITH WORLDWIDE GUIDELINES**

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Abstract

Introduction: The studies reported in this thesis investigated a number of patient orientated aspects of its current diagnosis, management and treatment in Kuwait. A comprehensive literature survey is presented with a detailed critical analysis of the very limited number of published material relevant to type 2 diabetes in Kuwait is also provided. A concise list of aims and objectives is also provided.

Methodology: The methodology used to derive knowledge of the present situation from the patient perspective, was a series of relevant questions, devised based on the internationally used diabetes Michigan questionnaire. Face to face interviews were used throughout for both patients and medical staff. Suitable data analysis was performed.

Results: A pilot study consulted 10 Kuwaiti and 10 non-Kuwaiti patients, and after analysis of their data it was found to be reliable, appropriate and capable of being analysed and so was extended to a larger study of 109 diabetic patients. These 109 diabetic patients were studied in thirteen clinics distributed throughout Kuwait. Two groups of patients were studied – Kuwaiti nationals and non-Kuwaitis both of whom were treated at these clinics during their residency in Kuwait. 38 questions were asked including demographics, medical treatment, monitoring of their disease, physiological consequences and dietary aspects. The major findings were that patients considered two major areas could be improved to enhance the treatment of their disease. The first was to improve the degree of empathy shown to them by the medical/nursing staff and secondly to provide simple practical advice on exercise, dietary considerations and renal aspects of their disease. More comprehensive findings are presented in the thesis but many of these were minor compared with these two major aspects. Also presented are interviews with the medical staff in Kuwait who treat diabetic patients and the problems they face when treating their disease. The opinions and views of selected ophthalmologists and renal specialists are also presented. Medical views were also sought in the UK- Ascot Rehabilitation above their experiences treating diabetic patients from Kuwait. Another aspect of the study was to interview Kuwaiti nationals who had been sent to a clinic in Ascot, UK for the treatment of the serious consequences of their conditions. Many of these were had type 2 diabetes and their views and perspectives of their treatment in Kuwait were gathered as being representative of the long term treatment of this condition.

Discussions and Conclusions: The thesis discusses in some detail all the results which were obtained and concludes with a series of recommendations which could be taken to improve the treatment of type 2 diabetes in Kuwait.

Keywords: Diabetes type 2, Kuwait, diabetic patients, renal problems, patient experience of their disease.

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Dedication

I dedicate this research to my father whom we lost several years ago due to type 2 diabetes and its complications. He is the reason why I started and ended this research with pride. I hope he's looking down at me smiling and happy at what I have accomplished.

I also dedicate my research to every single patient with type 2-diabetes and kidney disease and hope that this is a period of time in their lives that will end soon and they'll be 'cured'. I wanted to help each single patient with a diabetes and kidney disease to look after themselves and try to get as much knowledge on their disease as possible after all they need all this.

Finally, now I can say I've done something in my life, something that may help and save others.

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Abbreviations/acronyms

ADA	American Diabetes Association
AER	albumin excretion rate
ATP	Adult Treatment Panel III report
BMI	body mass index
DCC	diabetic care clinics in Kuwait
DKT	diabetic knowledge test
eGFR	estimated glomerular filtration rate
ESRF	end stage renal failure
GCC	Gulf Co-operation Council for the Arab States of the Gulf
GFR	glomerular filtration rate
IDF	International Diabetes Federation
IGT	impaired glucose tolerance
KOC	Kuwait Oil Corporation
MOHK	Ministry of Health of Kuwait
MOHSA	Ministry of Health in Saudi Arabia
NCEP	National Cholesterol Education Program
NDP	National Diabetes Programs
NICE	National Institute for Health and Care Excellence (UK)
NIH	National Institutes of Health
NKUDIC	National Kidney and Urologic Diseases Information Clearinghouse
SPSS	Statistical package for the social sciences
TKS	total knowledge score
USTNHNES Survey	United States' Third National Health and Nutrition Examination Survey
VEGF	vascular endothelial growth factor

Chapter 1

1 Introduction - Type 2 diabetes and its occurrence in Kuwait.

For a century diabetes mellitus has been an issue for global health care systems because of both the primary effects and secondary complications, which cause significant morbidity and mortality. To counter this disease, a variety of treatment options have been developed addressing the spectrum of diabetic patients' needs. Naturally, the varying capabilities and capacities of nations health care system across the world, in combination with the accessibility of their services, have a critical influence on the way their diabetic citizens are able to continue their lives.

The World Health Authority (WHO) recently issued an updated fact sheet, number 312, (WHO, 2013) about the problem the world faces concerning type 2 diabetes. Central to this information was the global-based, comprehensive study produced by Danaei *et al.*, (2011a) which used data from 370 country-years, which was calculated from 1980–2008 trends in mean fasting plasma glucose (FPG) and diabetes by sex, for 199 countries and 2.7 million participants. The concept of country-years, the same group had developed and published, earlier in 2011, when they considered global trends in systolic blood pressure. The method to calculate country-years used a Bayesian hierarchical model, and for those who require clarification, it is comprehensively explained in their 2011 paper (Danaei *et al.*, 2011b). Essentially, this concept uses data obtained from a country, but where completed data sets were impossible to obtain the concept of country-years was invented as this allows the maximum amount of data to be examined even though not all countries have equal data sets. This ability to use unequal data sets is fundamental to Bayesian type analysis and their probability testing based on aprior assumptions of distributions (Bayes & Price, 1763). Interestingly, both the studies of Danaei *et al.*, (2011a) were funded by the Bill and Melinda Gates Foundation and the WHO, emphasizing the worldwide interest in this topic.

In the extensive diabetes study by Danaei *et al.*, (2011a) they made the following data interpretation:-

"Glycaemia and diabetes are rising globally, driven both by population growth and ageing and by increasing age-specific

prevalence. Elective preventive interventions are needed, and health systems should prepare to detect and manage diabetes and its sequelae" (Danaei *et al.*, 2011a)

The primary aim of the management of type 2 diabetes is that any strategy effectively produces for the patient a better quality of life and minimizes the secondary manifestations of the disease such as the pathological changes caused by microvascular changes in the eye and kidney. Traditionally this was done by directions from the physician which the patient had to implement which were initially based on trying to control the disease with diet, exercise and better life style choices e.g. elimination of smoking and if these changes were unsuccessful then oral hypoglycemic drugs would be used. If this proved unsuccessful then insulin would be used. The effectiveness of all these measures was usually quantitatively assessed by determining blood sugar values or more recently by HbA1c measurements. This last measurement is now preferred since it gives an opportunity to assess glycemic control over a period of weeks rather than just a specific time point as the blood sugar measurement does. So to assess the effectiveness of any of the types of treatment the system of care has moved away from directions by the physician to what is known as patient centred care.

This focuses on patient needs rather than 'health care provision'.

One recent study states: 'There is current concern with patients' experiences of health care system around the world and patients have their own views on what is best for them and their priorities in life. So health professionals require flexibility to meet patients' needs. So, patients should work 'hand to hand' with health professionals to plan their care and their opinions must be considered and respected' (Royal College of Nursing, 2011).

The World Health Organization (WHO) now has a global strategy on people-centered and integrated health services, namely, 'WHO global strategy on people-centred and integrated health services' (WHO, 2015), which requires a fundamental change in the quality of health services, management and delivery. This is needed to meet the challenges faced by global health care systems. These changes aim to decrease treatment cost of chronic diseases, enable the population to live longer due to an improved quality of care and be suitable for an individuals' needs. Putting

people at the heart of the health care experience and integrating the services provided for them is still an urgent challenge faced by health care systems.

People –centered health services should provide individual education and support, so families and communities can make decisions so participating in their own care in the partnership with the health professional. Self-management includes assessment and treatment plans, personalised care and patient satisfaction surveys (WHO, 2015). The benefits of this system are comprehensively reviewed in this WHO document.

However this people-centred health care system requires more evaluation as to its effectiveness to ensure patients are diagnosed earlier, have an integrated health care plan formulated on an individual basis and which is adhered to throughout all their treatment for however long that takes. This personalized health care planning requires objective rather than subjective evidence. This thesis tries to establish the current situation in Kuwait for diabetic patients on the basis of such evidence. Once this is known then strategies to implement this patient-centred care might be possible to implement. Without this knowledge it would be impossible. If good glycemic control is obtained using such a method then reducing the disease consequences with far better outcomes for both patients and the health care system of Kuwait could be achieved. As suggested by Majeed *et al.*, (2014) glycemic control is one of the three key areas which have to be addressed when treating diabetes. The other two, were hypertension and dyslipaemia both of which will be mentioned in this thesis. Majeed *et al.*, (2014) also commented that the treatment of the disease should be carried out by multi-disciplinary teams of the primary care physicians, diabetes nurse specialists, podiatrists, pharmacists and other professional groups.

It is now appropriate to consider type 2 diabetes in Kuwait.

1.1 The Kuwait perspective of diabetes.

According to WHO and the International Diabetes Federation (IDF), in Kuwait, diabetes has reached epidemic levels. Over 25% of the native Kuwaitis suffer from diabetes and its consequences (Diabetes UK, 2006). Both type 1 and type 2 can lead to progressive, irreversible changes and because of the numbers involved this has profound consequences for the Kuwaiti health care system. One major complication is renal failure, and this will form a significant sub-part part of this thesis.

Many people in Arabic countries are at risk of developing this condition (Al-Rubean, 2005) and so Kuwait is not an unusual example to study.

1.2 A brief overview of the types of diabetes and its symptoms.

Diabetes is characterized by an increase in the fasting blood glucose concentration greater than 7.0 mmol/L known as hyperglycaemia, or a plasma glucose which is greater than 10 mmol/L, two hours after a meal. Hyperglycaemia occurs because of uncontrolled hepatic glucose output and reduced uptake of glucose by skeletal muscle with reduced glycogen synthesis (Rang *et al.*, 2012). Polyuria can also occur as the urinary glucose exceeds the threshold for re-absorption. An increased susceptibility to infection - both bacterial and fungal and constantly feeling hungry and thirsty due to the dehydration can also occur. Other symptoms include: weight loss, lethargy and fatigue and in some a 'smelly breath' due to the formation of ketone bodies (Walker & Rodgers, 2004). During ketosis there is an accelerated fat breakdown to acetyl CoA. In the absence of aerobic carbohydrate metabolism acetyl CoA is converted anaerobically to acetoacetate, beta hydroxybutyrate and acetone - the classical 'ketone bodies' (Rang *et al.*, 2012). More severe complications produced by these ketone bodies induced by the state of hyperglycaemia can include diabetic ketoacidosis which if untreated, leads to coma which is a medical emergency as it can be fatal.

The treatment of type 1 is usually dietary restrictions and insulin injections to replace that lost due to beta cells destruction. The different formulations of insulin: isophane, lispro and crystalline were developed to try and maintain a constant blood sugar level. In contrast, the treatments for type 2 are more diverse. In some people, although they produce insulin, due to insulin resistance it is less effective, and so drugs are given to increase glucose uptake in striated muscle, inhibit hepatic glucose output and intestinal glucose absorption – an example of which is metformin which does not require functioning beta cells. Another useful property of this drug is that it does not stimulate the appetite and so is very useful in obese patients, which will be a feature of particular interest in this thesis. In other patients, sulphonylureas, which stimulate insulin secretion, are given, but these individuals need to have functional pancreatic beta cells, adhere to a strict diet, do greater levels of exercise, regular monitoring of blood glucose levels and oral drug treatment (Walker & Rodgers, 2004).

1.3 Causes and consequences of diabetes.

The *precise* cause of type 1 diabetes is still the subject of much debate. Pancreatic islet beta cell destruction has been documented for decades caused by the individuals' immune system producing an absolute deficiency of insulin due to the autoimmune destruction of the beta cells. The precise way of immune system activation which targets the beta cells has three suggestions as to its mechanism. These are: a) genetic predisposition, greater than ten-fold in first degree relatives, of the individual due to autoantibodies to the HLA class II complex (Steck & Rewers, 2011, Coppieters *et al.*, 2012) b) viral damage due to Coxsackie or Echo virus (Filippi & Herrath, 2005) and/or c) complex environmental factors (Coppieters *et al.*, 2012). Type 1 usually occurs in young children or adolescents who are not obese when they first develop symptoms. Consequently an individual can develop type 1 diabetes in childhood, teenage years or adulthood. Diabetes UK (Diabetes UK, 2012) data for 23 000 people under the age of 17 stated that their diabetes started when they were: aged 0-4 years, 4%, 5-9 years, 19.1%, 10-14 years, 42.5%, 15 years, 11.4%, 16 years, 12.2% and 17 years, 10.7%. The 2004 NICE guidelines (NICE, 2004) has an additional group, 18 years and over, as type 1 diabetes is not restricted to people below the age of 18 as it can still occur in people in the age range of 20 -30 years.

In contrast, type 2 diabetes typically occurs above the age of 40 with no immune system involvement. The primary problems include insulin resistance and impaired regulation of insulin secretion. Complications of the condition, as it progresses were well documented by Stevens & MacFadyen (1972) including the major secondary features, of retinopathy and neurogenic deafness. A more recent comprehensive study (Rizvi, 2004) of type 2 diabetes consequences concluded the major disease problems were: a) **macrovascular disease** - two to four fold increased risk of myocardial infarction and stroke, b) **microvascular disease** - retinopathy, nephropathy and neuropathy and c) **other serious consequences of the disease** - blindness, need for renal dialysis, lower extremity amputations and unresolved bacterial infections. A recent Mayo clinic publication (Mayo Clinic, 2013) expanded on the pathological consequences of the disease to a number of different body systems: atherosclerosis, neuropathy, kidney damage, eye damage, foot damage, skin and mouth infections, osteoporosis, hearing loss and Alzheimer's disease.

Potentially, many factors determine whether an individual develops type 2 diabetes: sex, race, age, history of diabetes with direct (first degree) relatives. Further complicating factors include smoking, frequency and types of physical exercise routines and dietary patterns. While clear relationships have not been established in terms of prevalence, development, and severity across all of these categories, Al-Sultan & Al-Zanki (2005) have attempted to build on existing data and implications from the worldwide literature, relevant to the Arabic world, which will be used throughout the entirety of this introduction.

Diet is important for type 2 diabetics, as it is for type 1 diabetes, as the patients are required to control their intake of calories/ dietary constituents, such as sugar/lipid/salt. This may be self-initiated or following professional dietary advice as to which types and how much food they should consume. Dietary adherence is considered beneficial, while excessive consumption due to poor eating habits, is generally thought to cause diabetic complications. Exercise, its intensity and frequency, are also beneficial in relation to diabetes especially if helped by a professional plan of exercise. Other contributory factors include a previous medical history of ischemic heart disease, hypertension and hyperlipidaemia.

1.4 Diabetes and Kuwait

One major aspect of type 2 diabetes in Kuwait is the problem of an increased body weight. Body proportionality, in terms of the body mass index (BMI), has been related to type 2 diabetes (Rang *et al.*, 2012). A BMI alternative is the ratio of patients' waist and hip circumference. While BMI and waist to hip ratios are used to define obesity some studies have varying definitions of what constitutes obesity. Critical abnormalities in body mass indexes and/or waist to hip circumference ratios are clearly defined by Al-Sultan & Al-Zanki (2005), in their study of factors relevant to diabetes in Kuwait. They defined a BMI value equal to or greater than 30 as 'obese', while waist circumferences larger than 102 cm in men or 88 cm in women indicated obesity both of which were conducive to the prevalence, development, and/or severity of type 2 diabetes. The waist to hip ratios is considered above average if greater than 0.95 in men or 0.80 in women.

Other 'factors' indicative of type 2 diabetes, include biochemical measurements such as glycated haemoglobin (HbA_{1c}), plasma cholesterol and the levels of high-density

(HDL) or low-density lipoproteins (LDL) and triglycerides. For example, a value for HbA_{1c} less $\leq 7\%$ is regarded as being optimal for glycaemic control as compared with a control range for HbA_{1c} of less than 6%, or between 6% and less than but not equal to 7%. HbA_{1c} levels 8 % or above are considered dangerous and therefore indicative that some form of additional action is required in the treatment of their diabetes (NCEP, 2003; American Diabetic Association, 2003). Similarly, net serum cholesterol, low density levels of cholesterol, and triglycerides, values (respectively) below 5.2 mmol/L, less than or equal to 2.6 mmol/L, and less than 1.7 mmol/L are considered healthy and not conducive to some aspect of type 2 diabetes. HDL levels are seen as a problem if they are under 1.1 mmol/L, for men, or 1.3 mmol/L for women (NCEP, 2003; Al-Sultan & Al-Zanki, 2005).

Similarly, **hypertension** is more common among patients with type 2 diabetes than aged matched patients who were non-diabetic, who can have abnormally high levels of both cholesterol and triglyceride and in Kuwait there is a positive association between lipids and diabetes (Al-Sultan & Al-Zanki, 2005). The found that abnormally low levels of HDL were common in type 2 diabetics, so increasing the risk of developing conditions such as atherosclerosis which may prove fatal for the patient.

1.5 Treatment strategies for diabetes.

Before any pharmacological treatment of type 1 and 2 diabetes commences, lifestyle and dietary advice is usually given - on smoking, exercise and how to achieve an optimal body weight. Specific details are given on the selection of foods to reduce sugar/lipid intake. In terms of drugs the NICE guidelines (NICE, 2010) suggest the following. For type 1 diabetes the pharmacological treatment is to use insulin in a range of different formulations/doses to control the blood glucose. For type 2 it is more complicated.

1.6 A brief overview of the pharmacological treatment of type 2 diabetes.

A summary of the pharmacological treatments for type 2 diabetes is provided below. **The first line drugs** include metformin, insulin secretagogues and acarbose. Essentially, metformin, which decreases glucose neogenesis and also increases peripheral utilization of glucose acts in the presence of endogenous insulin so can be used in patients who are a) patients who have a residual pancreatic islet cells, b) of

the 'accepted' body weight and c) in overweight and obese patients where control has been impossible to achieve by using lifestyle and dietary changes. If these drugs fail then a secretagogue, such as a sulfonylurea, may be added to the treatment regimes. In patients of 'accepted' body weight the sulfonylureas, can also be used as first line drugs. Acarbose, an inhibitor of intestinal alpha glucosidases which delays the digestion and absorption of starch and sucrose is usually restricted to those patients who have not been able to use other oral glucose-lowering medications (NICE, 2010).

Second line drugs are given when blood glucose control is inadequate.

Dipeptidylpeptidase-4 (DPP-4) inhibitors which increase insulin secretion and lower glucagon secretion, include sitagliptin and vildagliptin. These are added to metformin therapy as a second line treatment instead of a sulphonylurea to achieve a better degree of blood glucose control. Other second line drugs include thiazolidinediones such as pioglitazone and rosiglitazone, which reduce peripheral glucose resistance, leading to a reduction of blood glucose concentration, but in light of the advice of the MHRA/CHM in 2011, because of their potential toxicity to the cardiovascular system and bone density, their future is uncertain.

Third line drug treatments are used when blood glucose control proves to be very difficult and combines thiazolidinediones with metformin and sulfonylureas.

Another third line drug is the glucagon-like peptide-1 receptor agonist (GLP-1) mimetic exenatide, given to obese patients with a BMI of over 35 kg/m² or when insulin treatment is not practical for reasons of lifestyle. Finally, for severe, refractory patients, insulin can be used in combination with metformin and sulfonylureas and acarbose.

1.7 The complication(s) of renal failure.

The treatments associated with advanced levels of diabetes, ranging from complex oral hypoglycaemic medication regimes (see the NICE guidelines comments immediately above) to insulin injections, try and counter the potentially serious cardiovascular complications, metabolic syndrome and/ or renal failure occurring in diabetics. A recent study concluded that 43.8% of all renal failure cases were due to diabetes (National Kidney & Urologic Diseases Information Clearinghouse (NKUDIC), 2010). This data also shows that renal failure due to cardiovascular disease was 26.8% i.e. 61% of the diabetes number whereas renal problems due to

glomerulonephritis 17%, cystic disease 5% and urological diseases 4.5% led to the conclusion that diabetes causes more cases of renal failure than for any other cause seen in medicine (Figure 1). To avoid the occurrence of such a problem needs available resources and healthcare accessibility and in this regard Kuwait is no exception making a study of renal problems of diabetes worthy of investigation.

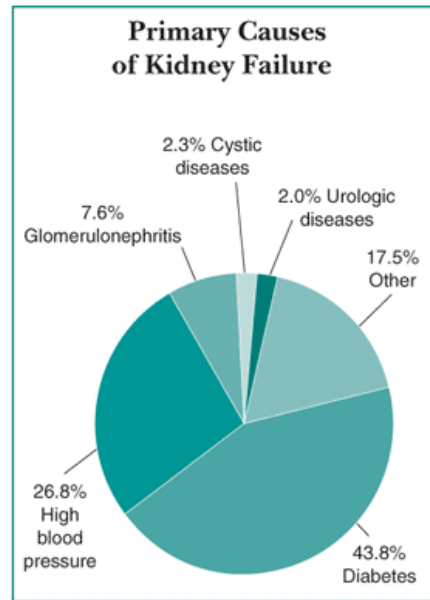


Figure 1.1 Relationships between Diabetes and Renal Failure (source: NKUDIC, 2010)

The pathogenesis of kidney diabetic lesions is still a topic of great speculation. In a special article in the American Society of Nephrology (Cohen-Tervaert *et al.*, 2010), they suggested that the mechanism could be due to intracellular changes within the kidney glomerulus and also cells lying outside this structure. For example, the mesangial cells in the renal glomerulus may expand causing changes to the adjacent glomerular basal cell membrane and this expansion compromises the ultrafiltrate production. Another possible mechanism could be angiopathic capillary changes in both the kidney glomerulus and the associated interstitial capillaries i.e. glomerulosclerosis and intercapillary glomerulonephritis, both of which will cause an adverse effect on renal function.

Diabetic renal nephropathy, causes proteinuria, due to permanent changes in filtration and if left untreated, leads to end-stage renal failure. This serious complication requires either haemo- or peritoneal dialysis or even kidney transplantation. If the data shown in the 2010 NKUDIC study is similar to that of

Kuwait, then patient education about this condition, dietary advice and monitoring of their disease, central factors of patient centred care, assume great importance to reduce the morbidity produced by this condition.

1.8 The problem of microalbuminuria.

A number of studies concerned with diabetes have focused on the relationship between microalbuminuria and type 2 diabetes (Lee *et al.*, 1995). They studied the association between the rate of urinary albumin excretion with the glomerular filtration rate (GFR). In their analysis of 284 Korean diabetic patients, 64 were diagnosed with microalbuminuria and 71 with glomerular hyperfiltration. They concluded that the mean prevalence of GFR in microalbuminuric patients was not substantially different from that of normoalbuminuric patients (24% as compared with 28 %). One year later, Vedel *et al.*, (1996) analysed patients below the age of 66 years with microalbuminuria assessing the glomerular filtration rate over a four hour period. They concluded that patients who did not require antihypertensive treatment had a higher rate of glomerular filtration in microalbuminuria in comparison with normoalbuminuria.

However, testing methods for microalbuminuria are complex and still evolving and their significance in diabetes is as yet not completely reliable. The tests for microalbuminuria include - immunoturbidometry, radioimmunoassay and immunophelometry (Clavant *et al.*, 2007) but these tests have not been used in any of the reported Kuwait used below.

1.9 Renal disease and treatment in type 2 diabetes

Treatment options for type 2 diabetes induced renal disease depends upon various 'biochemical' levels in blood and urine. Sometimes, examination of such 'biochemicals' in a patient with existing renal disease may reveal the cause as either being diabetes or other factors. Consequently, the treatment options for renal disease in type 2 diabetes require a thorough biochemical assessment of renal function. Some studies recommend that urine albumin levels should be done immediately following the diagnosis of type 2 diabetes, and once per year following diagnosis (McIntosh *et al.*, 2002). When increased levels of urinary albumin are found in a patient's urine and also when retinopathy is also present, this is treated as renal disease. If however, retinopathy does not exist, patients and physicians should consider that alternative

possible causes exist than diabetes (McIntosh *et al.*, 2002). The existence of increased urinary albumin or serum creatinine (or in some cases both may be raised) in a patient diagnosed with type 2 diabetes indicates a greater risk for premature cardiovascular complications and this may predict an increased chance of end-stage renal disease. If retinopathy is present, the chances that the patient will be diagnosed with diabetic renal disease are further increased.

More specifically, the increased risks associated with high levels of urinary albumin are defined across two categories: microalbuminuria and proteinuria. In the instance of microalbuminuria, the creatinine ratio of 2.5 mg/mmol or greater in men or a 3.5 mg/mmol in or greater in women can exist. In contrast, in proteinuria, the respective concentration ratios are 30 mg/mmol or more or otherwise and a concentration of albumin at 200 mg/l or higher (McIntosh *et al.*, 2002).

Microalbuminuria, or incipient nephropathy, is the earliest potential sign of diabetes causing renal disease. Studies have been reported that it is commonly predictive of cardiovascular morbidity, cardiovascular mortality and total mortality (Dineen & Gerstein, 1997). They used a variety of techniques for measuring urinary albumin levels and their results have enabled values for normal function and abnormal function to be established. Gathering a timed sample of urine was considered to be the most effective method for detecting microalbuminuria. Winocour & Marshall (1998) reported that a range of 30-300 mg over 24 hours and other various ranges for different time frames was said to be typically indicative of abnormally high microalbuminuria.

In contrast, proteinuria, also known as macroalbuminuria, is considered to be a more 'drastic' rise in urinary albumin, usually associated with a greater progression of urine albumin excretion in comparison to microalbuminuria (McIntosh *et al.*, 2002). Unlike microalbuminuria, however, there is no defined end value for albumin as an indicator, and there is also an overlap between the specific ranges of albumin used to define either microalbuminuria or the end values of the ranges for proteinuria as described in some areas of research (MacLeod *et al.*, 1995). Twenty-four years ago, studies indicated that proteinuria could be a precursor to cardiovascular morbidity or mortality, was established by an endpoint value of 300/mg per one day sample of urine, as well as a >200 mg/l value for a spot urine sample for analysis (Schmitz &

Vaeth, 1988; Gall *et al.*, 1991) was significant. According to Dineen & Gerstein (1997), patients were capable of acquiring and moving beyond proteinuria to end stage renal failure. In Denmark, Fioretto *et al.*, (1996) and Parving *et al.*, (1992) conducted cross-sectional analyses of 363 Danish type 2 patients under the age of 66. Of these 363 patients, 50 of them were categorised as having persistent proteinuria, defined as having approximately 300 mg albumin in urine across a one-day period, and 36 of these 50 patients experienced diabetic glomerulopathies. Additionally, 22% to 37% of glomerulopathy patients also suffered from proliferative or simple retinopathy, while none of the glomerulopathy patients without diabetes experience retinopathy (Parving *et al.*, 1992). This suggests that arriving at a consensus about renal disease, microalbuminuria and proteinuria in relation to type 2 diabetes is very difficult.

However, subsequent studies and observations have accumulated evidence to improve the analysis, treatments, definitions or renal problems in diabetes. Renal failure is of high importance because of its severity and ability to cause further complications. The stage of diabetes and renal disease should be continually analysed in detail for the purpose of developing guidelines for awareness, treatment, and prevention where possible. For example, if a patient's level of serum creatinine is above 150 μ mol/l, the patient is referred to a specialist for nephrological evaluation, counselling, and preparation for end stage renal failure (McIntosh *et al.*, 2002).

Concerning prevalence, cross-sectional analyses have demonstrated that persistent microalbuminuria is present in roughly 20% of patients while proteinuria is evident in roughly 15% of patients. Furthermore, UK studies have found that diabetes is the primary cause for patients to seek a renal replacement programme, where most of these patients have type 2 diabetes. Fifteen percent of United Kingdom residents within the renal replacement therapy programme have been diagnosed with diabetes. In the UK the prevalence of diabetes patients scheduled to receive kidney transplants is nearly six times greater in the African and Asian ethnic groups than in Caucasians (McIntosh *et al.*, 2002).

The evidence for type 2 diabetes causing microalbuminuria and macroalbuminuria (proteinuria) has been compiled in some additional studies. Gupta *et al.*, (1991) defined microalbuminuria as a stage within the development of diabetic nephropathy while being the forerunner of overt diabetic nephropathy. Meanwhile,

epidemiological research in microalbuminuria has created a variety of prevalence data, including the rates across categories. Variability has been observed in many cases, while this may be explained according to differences in the duration of the disorder as well as in the different techniques used in the initial urine collection assessment processes. Other factors, including physical exertion and even posture, have been further discovered to have a significant influence over the rates of albumin excretion (AER) (Gatling *et al.*, 1988). Despite these findings, there is no general consensus among researchers, with each laboratory participating in these studies recording their own range, as to what it regarded as normal. These varying levels have caused difficulty in attempting to assess diabetic nephropathy. The broad quantitative range has ranged from the 8% as documented by Gatling *et al.*, (1988) to 32% as reported by Bruno *et al.*, (1996). Such a large range might be the result of the varying techniques employed in task of the urine gathering and analysis, or it may also be the result of variation in the conduct of population sampling analyses. Only five of the analyses considered were actually based on a definite population, while the remainder of the studies obtained their values from clinical populations. As a result of such sampling, there may be a statistical bias of true prevalence. Many of the studies were within European populations, where six of the analyses revealed a prevalence of microalbuminuria to be near 25% (Gall *et al.*, 1991, Mattock *et al.*, 1992, McIntosh *et al.*, 2002). These studies also revealed a higher tendency for males to experience this health complication in comparison to females. Additionally, as previously mentioned, separate new studies have discovered new ways of measuring microalbuminuria and these include immunonephelometry, immunoturbidimetry, and radioimmunoassay (Clavant *et al.*, 2007) which may change the baselines in the future.

The prevalence, relevant relationships and other implications of macroalbuminuria of proteinuria in diabetes were as low as 5% (Standl & Stiegler, 1993) and as high as 19 % as reported by Vijay *et al.*, (1994). In the last study the range may be attributed to the variations in urine collection techniques. Meanwhile, the prevalence of proteinuria was typically less than for microalbuminuria where 75% of the relevant studies reported the prevalence rate to be near 15 % (Lee *et al.*, 1995; Bruno *et al.*, 1996).

Naturally, assessing end stage renal failure is of great concern in assessing and treating type 2 diabetes. Renal disease in diabetes is the main cause of end stage renal failure (ESRF) and while a minority of diabetes patients opt for renal replacement therapy is still a considerable number. The inherent risk of nephropathy is equal across patients with either type 1 or type 2 diabetes. However the much greater prevalence (90%) of type 2 diabetes as compared to type 1 means that renal failure is commonly associated with type 2. The prevalence of end stage renal failure in type 2-diabetes is clearly evident in the studies of McIntosh *et al.*, (2002) and Lippert *et al.*, (1995). The latter observed that of 225 patients admitted for renal replacement therapy over an 18-month period in Germany, 38% of these suffered from type 2 in comparison to 4% who suffered type 1 diabetes. Researchers have long considered diabetic renal disease to be a primary cause of end stage renal failure, but the lack of data has made establishing clear distinctions between renal problems in type 2 and type 1 diabetes somewhat difficult (Roderick *et al.*, 1994; McIntosh *et al.*, 2002).

Earlier, Gokal *et al.* (1987) found that 17% of all patients beginning long-term dialysis were diabetics. Seven years later, Roderick *et al.*, (1994) discovered that many patients treated in the renal units across the Thames Region of the UK were diabetics as the number of diabetes who required dialysis treatment was 15%, and 10% of diabetic patients were required to have kidney transplant treatment (Roderick *et al.*, 1994).

Twenty five years ago a collaborative study involving the Royal College of Physicians, The Renal Association, and the British Diabetic Association considered the number of diabetes patients that had yet to receive attention for their renal failure even though the exhibited levels of serum creatinine $> 500 \mu\text{mol/l}$. They discovered the number of diabetics who had suffered end stage renal failure was 10.3% across a single year (McIntosh *et al.*, 2002). Today, thirteen years later, additional research is still needed for this specific statistic and the WHO (2006) reported that the exact relationship between renal disease and diabetes had generally relied on irregularly conducted, not periodic research, and so was not known.

As previously mentioned, diabetes prevalence varies according to ethnicity, and some UK research revealed that the Asian community had a particularly high

prevalence of type 2 diabetes. One of the earliest studies, Mather and Keen (1985), found that Asians over the age of 30 were nearly 4 times as likely to become diabetic in comparison to Caucasians. In contrast, below the age of 30 this trend was not statistically significant. Three years later McKeigue *et al.*, (1988) reported that in a local population of Bangladeshi origin aged between 35 and 69 years, they were 3 times more likely to suffer diabetes than the local Caucasian population. A higher rate of type 2 diabetes in the Asian population was collected in the form of survey data revealing a greater rate of renal complications as a result of diabetes across this group. In Leicester, a study reported that the relative risk of renal replacement therapy occurring as a result of diabetic nephropathy in Asians in comparison to the Caucasian population was 13.6 (Burden *et al.*, 1992). In the same study, all Asian patients undergoing renal replacement therapy as a result of diabetic nephropathy were suffering from type 2 diabetes (Burden *et al.*, 1992; McIntosh *et al.*, 2002). Roderick *et al.*, (1994) had also studied trends in 6,000 patients who were receiving renal therapy and found that both Asians and Africans were nearly six times as likely as Caucasians to require renal replacement therapy once being diagnosed with diabetes as it progressed to end stage renal failure.

Researchers in the United States have assessed similar situations. Stephens *et al.*, (1990) examined over 1,000 patients receiving treatment for diabetes and found that, aside from a 70.6% prevalence of diabetes, Africans were over 4 times more likely than Caucasians to have end stage renal failure stemming from either type of diabetes. Similarly, Cowie *et al.*, (1989) assessed numerous United States patients between the years 1974 and 1983 found that African-Americans were more likely to suffer type 2 diabetes. Later, Pugh *et al.*, (1995) assessed Hispanics, Africans, and Caucasians and discovered that of the 523 diabetic patients, 47% were of Hispanic origin, 32% were African, and 21% were Caucasian. These variations in prevalence rates are a recurring trend among studies which have considered different ethnic groups. Consequently, type 2 diabetics are at a considerable risk of developing end stage renal failure and if biochemical indicators suggest renal function is declining, physicians should refer them to a specialist who can provide counselling and preparation for the initial stages of a renal failure programme (McIntosh *et al.*, 2002).

1.10 Prevalence and progression of renal disease in type 2 diabetes.

The speed of the progression of renal disease in these patients can vary greatly from patient to patient, based on: other medical conditions, general state of health, body chemistry and other diverse factors (McIntosh *et al.*, 2002). Physicians' guidelines recommend that urine albumin and serum creatinine levels should be measured immediately following diagnosis and then at a minimum, annually, in order to optimise the probability of a more positive outcome and improving their health. According to McIntosh *et al.*, (2002) 25% of type 2 diabetics, will exhibit microalbuminuria at the time of their first diagnosis whilst patients measured as normal during diagnosis have a 15% chance of developing microalbuminuria and a 5% chance of developing proteinuria within the following 5 years (McIntosh *et al.*, 2002). It is estimated that 20 % of microalbuminuric patients capable of surviving for a decade will further develop proteinuria, while approximately 50% will continue with microalbuminuria, and the remaining 30% will be fortunate enough to return to a normal status. Meanwhile, patients who are treated at the onset of proteinuria and hypertension will progressively lose glomerular function at a rate of near 8 ml per minute per year. Some evidence suggests that this rate is also observable in type 1 diabetics (McIntosh *et al.*, 2002). In other analyses, patients having survived a decade or more of type 2-diabetes are at an 8% risk of renal failure.

The specific stages of renal disease can be classified based on the rising levels of albumin in the urine, while those who do not experience a rising level are referred to as normoalbuminuric. Initially, the slow albumin excretion is usually referred to as microalbuminuria, as mentioned above. However as the condition develops proteinuria in some becomes substantially more rapid whilst in others it can remain steady for a substantial period of time, or even revert to a more optimal state. According to Wirta *et al.*, (1996a), out of 146 patients analysed over 6 years, 17 patients died due to complications and from 109 patients from whom urine samples were fully assessed, 18% progressed from normal to microalbuminuria, 3 % developed proteinuria and the remainder maintained their status. In an earlier similar study, Niskanen *et al.*, (1993), studied 133 recently diagnosed type 2 patients and when examined over a five-year period, 11 patients died and the remaining 108 patients provided data which was further analysed which showed 43% of patients returned to normal excretion levels and 57% maintained their microalbuminuria.

Furthermore, this study found no significant differences across the groups in those maintaining or revert their stage of diabetes, with regard to age, sex, blood pressure or body mass index

Another study by Mattock *et al.*, (1998) examined 100 type 2 patients who exhibited normal rate of urine albumin excretion over a three to seven year period and found that 23 % of patients developed microalbuminuria, 6 % developed proteinuria and the remainder maintained a 'normal' state. Wirta *et al.*, (1996b) made similar findings of the progression of patients with microalbuminuria, as 46% maintained their state and 19% progressed to proteinuria within six years. Similarly, Patrick *et al.* (1990) assessed 149 recently diagnosed type 2 patients in terms of their albumin excretion rate in direct comparison to creatinine levels (via early morning urinalysis). Over the following year, 68% were classified as normal, 16% had intermittent microalbuminuria, and 16% had persistent microalbuminuria. Within the persistent group, 86% exhibited increased levels of albumin to creatinine at the baseline, while the remaining 14% were classified as normal (Patrick *et al.*, 1990; McIntosh *et al.*, 2002).

Studying groups of 'established type 2 diabetics' has been particularly useful in regards to progression to various stages or reversion. An early study by Mogensen *et al.*, in 1984 examined 232, type 2 patients across an entire decade. Their research was designed to discover whether in their patient group microalbuminuria was able to predict the probability of overt nephropathy (proteinuria) developing. They defined microalbuminuria as a concentration of albumin ranging between 30 and 140 mg/l, while proteinuria was defined as an albumin concentration range above 140 mg/l (Mogensen *et al.*, 1984; McIntosh *et al.*, 2002). They always used early morning urinalyses and had a ten-year follow-up assessment. 22% of the patients' originally exhibiting microalbuminuria had progressed to proteinuria, as compared with 5% of the patients who were below the minimal level in the initial assessment. In a similar study, Beatty *et al.*, (1995) assessed 94 patients with type 2 diabetes, of which 50% were diagnosed with microalbuminuria, and the other half had normal levels. Only 25 patients with microalbuminuria were still alive at the end of the eight-year assessment period. Of the remaining, 25 patients, 19 were further assessed for statistical follow-up and showed that 26% had developed proteinuria, 42% maintained their excretion level, and 32% reverted to normal (Beatty *et al.*, 1995).

Due to the fact that there is no associated deterioration of blood pressure (or glycaemic control) in patients having persistent microalbuminuria in comparison with those whom had reverted to normoalbuminuria, experts have postulated that variations in albumin excretions accounted for the reversion. However, early morning sampling may have been "vulnerable" to measuring albumin excretion across samples in comparison to timed samples.

1.11 Global scale of diabetes.

Diabetes is a global issue and the International Diabetes Federation (IDF) is an organisation which collects and publishes data obtained globally. Their stated purpose in their website: <http://www.idf.org/who-we-are> reads:

“The Federation’s activities aim to influence policy, increase public awareness and encourage health improvement, promote the exchange of high-quality information about diabetes, and provide education for people with diabetes and their healthcare providers. IDF is associated with the Department of Public Information of the United Nations and is in official relations with the World Health Organization (WHO) and the Pan American Health Organization (PAHO).”(IDF, 2014).

The organisation also explains from where it acquires its data.

“The International Diabetes Federation (IDF) is an umbrella organization of over 230 national diabetes associations in 170 countries and territories. It represents the interests of the growing number of people with diabetes and those at risk. The Federation has been leading the global diabetes community since 1950”. : <http://www.idf.org/who-we-are> .

Consequently their data is both widely published and as up-to-date as is possible and it is taken in the subject area as an authoritative source. Their data was used to produce Table 1.1 showing USA and UK rates as compared with a number of Middle Eastern countries. Table 1.1 shows the prevalence of diabetes mellitus (DM), Impaired Glucose Tolerance (IGT) according to IDF data (IDF, 2013)

Table 1.1 The comparative prevalence in 2013 of diabetes mellitus and impaired glucose tolerance (IGT) according to the International Diabetes Federation (IDF) for the UK and USA as compared with countries from the Middle East

[Source International Diabetes Federation (IDF, 2013 b)

<http://www.idf.org/atlasmap/atlasmap>].

Country	Comparative prevalence of diabetes mellitus (%)	Comparative prevalence of glucose tolerance (%)
UK	4.92	6.6
USA	9.21	12.4
Baharin	21.8	16.4
Egypt	16.8	7.4
Kuwait	23.1	17.9
United Arab Emirates	19.0	16.6
Lebanon	15.0	7.5
Qatar	22.9	17.1
Saudi Arabia	24.0	1.3

In 2011 the IDF found that globally, 366 million people were considered diabetic in both low and middle-income countries (IDF, 2011). In 2013 this figure increased to 382 million and for 2035 the projected figure is 592 million. Based on these figures, the World Health Organization (WHO) considers diabetes an ‘epidemic’. The recent IDF report, sixth edition (IDF, 2013) suggests that diabetes, in the age group 20-79 years, caused 8.4% of deaths (5.1 million people) for all-cause global mortality (IDF, 2013). The Arabic countries are clearly part of this ‘epidemic’.

1.12 Diabetes in Arabic Countries.

In 2007, four out of the top five countries affected by diabetes were in the Arabic world (Farag & Singh, 2009) based on a study at the Harvard Medical School, (USA) in Boston and Dubai. They found in 2000, the Arabic world had 7,814,000 diabetics set to rise to 22,157,000 by 2030. Using 2007 data from different Arabic countries they produced rank order of adult diabetes. The highest was the United Arab Emirates (UAE) (19.5%), then Saudi Arabia (16.7%), Bahrain (15.2%) and Kuwait (14.4%) When using the 2000 and the 2030 projected values the data was: the UAE in 2000, was 350,000 and would rise to 684,000 by 2030; Saudi Arabia, 890,000

rising to 2,523,000; Bahrain 37,000 rising to 99,000 and Kuwait 104,000 rising to 319,000. In three other Arabic countries a similar pattern emerged. Jordan had 195,000 diabetics in 2000 rising to 680,000 in 2030; Libya had 88,000 rising to 245,000 and Morocco, 427,000 rising to 1,138,000. This study also found that type 2 diabetics were usually within the age range of 45-64 years and the elderly > 65 years. Their analysis found that Jordan, Libya, Morocco and Oman had a diabetic prevalence of 3% before 1980, which on current trends may rise to 5% to 16% for their adult populations. An important finding was that in Jordan, the correlation between diabetes and end-stage renal disease (ESRD) was found to be 29.2% of its populace and in the UAE 23.3% of patients with ESRD had this condition due to diabetes (Farag & Singh, 2009).

Another aspect of diabetes in the Arabic world is its financial implications. For example, in 2010, 2.5 million Saudis were diagnosed with diabetes, an increase of 1.6 million (or 183%) over the previous 18 years (Alhowaish, 2013). This increase is estimated to have cost the Ministry of Health in Saudi Arabia (MOHSA) a 500% increase in expenditure over the last 18 years. The MOHSA considers diabetes and its consequences as an economic burden on the country and its healthcare system (Alhowaish, 2013). This reflects the costs of treating a diabetic patient as being ten times higher, at \$3,686, than a non-diabetic patient, \$380. In 2010, MOHSA total health expenditure was \$9.4 billion of which 10% (\$0.9 billion) was to treat diabetic patients. The diabetes economic burden in Saudi Arabia will be \$2.4 billion in 2015, an increase of \$1.5 billion, or nearly three times the level in 2010 and may increase still further to \$6.5 billion or 7 times higher than in 2010 (Alhowaish, 2013).

Consequently, they have included diabetes-related education for both the disease and its complications in their health care programme, using community screening campaigns to detect diabetes early, concentrating diagnostic facilities in health centres and introducing diabetes management systems trying to diagnose patients at an early stage of their disease (Alhowaish, 2013). The indirect costs of diabetes, including the ability of people to work due to disease-related disability / loss of production because of morbidity and mortality were also examined and they mentioned that Saudi has developed effective policies and strategies to address diabetes and its entailing complications to modify future public health spending (Alhowaish, 2013).

In a recent additional study about Kuwait (Badawi *et al.*, 2015) studied five key care areas measures in primary health care in Kuwait City in three government clinics and one private clinic of the highest case load, to assess the quality of services and care that patients with diabetes should have such as: measuring - HbA1c test, blood cholesterol, kidney function test, blood pressure, and checking their smoking status. The study found that only 63% of the patients received one or more HbA1c tests in 2012 compared to 30% of the patients in 2010. Around 34% received a lipid test in 2012, as compared to 30% in 2010. In 2012 only 34% of the patients were tested specifically for LDL cholesterol a slight improvement as compared with 2010. In comparison with testing for lipids by countries such as Spain and Australia (50%), Abu Dhabi (58%) and Italy (70%), Kuwait recorded the lowest annual lipid test.

In 2012, 25% of the patients had a kidney function test as a part of their annual checkup while in 2010 only 8% had received such a test. The study reported that in 2012 the blood pressure was not calculated but in 2010 it had been 45% which compares with baseline rates, for the UK and USA of 51% and 61% respectively.

In Kuwait the annual smoking check averaged 81% compares favourably to the UK annual check average of 85%. However, annual checks the status of smoking among diabetic patients in 2012 was less than year 2010. The authors mentioned that intervention to keep the high level of the annual checks the status of smoking among people with diabetes should be maintained

The study mentioned four limitations. Firstly, the results in other centers may be not similar, secondly, diabetes test performance was not comprehensive, thirdly clinical performances were not recorded. Their conclusion that there is no systematic factors affecting the rate of missing clinical data is of great interest since it re-enforces one of the major findings of this thesis.

In a recent study about Gulf countries (Omar *et al.*, 2016), which described the status of the control of diabetes, its complications, and the quality of diabetes management in the Kingdom of Saudi Arabia, Kuwait, United Arab Emirates (UAE), an insight into the relationship between these factors. 17 diabetic clinics participating in this study from three countries from May 31, 2009, to January 18, 2010 was obtained. They studied 1290 diabetic patients, with a mean age of 49.4 ± 12.3 years and duration of diabetes of 8.7 ± 5.9 years. The data was based on the examination of

the medical records to determine patient demographics; HbA_{1c}, blood lipids, blood pressure and diabetic complications. The HbA_{1c} values, suggested poor blood sugar control mirrored perhaps by 34.9% having neuropathic complication of the disease, 29.9% had retinopathy, 14.1% had cataract, more than 10% with cardiovascular complications and 34.4% of patients had microalbuminuria. This paper contains some interesting data about the drugs these patients were using. For example, 43.3% were taking oral hypoglycaemic agents and the 39.3% used both oral agents and insulin. Their conclusion that the standard of care for patients with diabetes was found to be sub-optimal. Better management of diabetes to prevent or delay the diabetes complications was required.

Another study about type 2 diabetes in Arabic speaking countries (Badran & Laher, 2012) concluded that unhealthy food and low levels of exercise contributed to the prevalence of type 2 diabetes and its complications in Arabic speaking countries. Early education in the early stages of the disease and also about chronic disease, healthy food and exercise to prevent obesity which is the main reason for diabetes prevalence in Arabic speaking countries would be very useful. Healthy practices and good management of type 2 diabetes can be done in ways which do not affect the Arabian cultural norms. Programs to motivate patients to changes their lifestyle eating healthy food and increasing their amount of exercise are both very important, enabling them to enhance self-care, and they should be started in all Gulf countries (Al-Rasheedi, 2015).

In an extensive study about diabetes in the Middle-East and North Africa, Majeed *et al.*, (2014), had the following data interpretation:-

“... Enhanced research on the epidemiology of diabetes needs to be combined with more effective primary prevention of diabetes (particularly in areas such as diet, exercise and obesity); and the early detection and improved management of patients with established diabetes, including an increased focus on self-management by patients and carers, and management in primary care and community settings” Majeed *et al.*, (2014).

1.13 Experience of diabetes education in selected Arab countries.

A 1997 Egyptian survey, studied the knowledge, skills, practices and attitudes of 1600 young patients (adult and children) with type 1 diabetes and their parents (

Assaad , 2005). The data was published as a book chapter entitled '*Education and diabetes in the Arab region*' and their comments, included:

Fewer than 2% of patients with diabetes or their parents had attended educational activity outside formal medical contacts

Fewer than 12% of the patients had an educational experience for greater than 30 minutes.

His most surprising findings can be summarized in the following way:

- *82% of the patients thought their diabetes was temporary.*
- *56% were not able to recognize or diagnose ketosis.*
- *52% never change their insulin injection site.*
- *52% stored insulin incorrectly.*
- *56% failed to comprehend the importance of foot care.*
- *80% of patients used only one daily dose of insulin.*
- *98% suggested that diabetes kept them away from success.*
- *46% considered that controlling diabetes deprived them of a good quality of life.*

Two examples, (using his own words) are:

- *"55% did not know how to deal with hypoglycemia"*
- *"52% did not know how to adjust insulin dosage" (Assaad, 2005).*

A similar study does not exist for Kuwait and one of the reason for this thesis was to collect such data.

1.14 Overview of the literature of studies relevant to diabetes in Kuwait.

Databases checking using suitable search terms for diabetes in Kuwait produced a very limited number of papers summarized below.

In 2009, Sajjad (2009) concluded that in Kuwait diabetes was a major health problem and summarized the situation as: '*continues to have the highest rate of diabetes, per capita, in the world*'. Two years later Alhyas *et al.*, (2011) published data from The Co-operation Council for the Arab States of the Gulf (GCC) where they concluded about the treatment of diabetes was: "*We found the extent of control to be sub-optimal and relatively poor*" (Alhyas *et al.*, 2011).

In 2010, Shaw *et al.*, (2010) found that the diabetes rate in Kuwait was over 15% of the adult population and 22 for every 100,000 children under the age of 14 years. Their projection was that **if** the lifestyle of both the young and adults

remained unchanged, then these diabetics would add to the global number of diabetics, which may exceed 300 million by 2025 (Al-Adsani *et al.*, 2009; Shaw *et al.*, 2010 ; Danaei *et al.*, 2011b).

Previously, in 2007, when the data for Kuwait was calculated, it limited the age group to 20 - 65 years and the prevalence was 12.6% (El-Nesf *et al.*, 2008).

However, without an age range, in 2011 the prevalence reached 21.2% as reported by Al-Taweel *et al.*, in 2013. According the IDF data shown in Table 1.1 the prevalence has almost doubled in the last 7 years, reaching 23.1% in 2013 (IDF, 2013). All these seemingly variable values may reflect the great inherent difficulties of carrying out such studies when only samples are taken rather than assessing the entire population. Al-Rubean (2005) summarised the difficulties and gave the following reasons to account for such variable data:

- “*different criteria used to diagnose both diabetes and IGT*”.
- “*differences in sample size and study type*”.
- “*most studies have focused on certain sex, age, or type of diabetes.*”

To help their diabetic patients, the Kuwaiti Ministry of Health developed a series of specialised clinics, diabetic care clinics (DCC), distributed in all the administrative regions, examples include: Salwa, Sabah al Salem and Salmeya. Figure 1.2 is a map of Kuwait showing the different regions mentioned above. For diabetic patients from their **first screening** they provide primary health care and follow up for three months. For diabetic patients with complications : coronary artery disease, peripheral vascular disease, stroke, diabetic neuropathy, diabetic retinopathy and renal failure they are referred to specialized hospitals for tertiary care.



Figure 1.2 Map of Kuwait showing the different regions of Kuwait. [Source: <http://www.kuwaitiah.net/kuwaitmapa.html>]

Three studies, Al-Adsani *et al.*, (2008), Awad *et al.*, (2008), Al-Shaheen *et al.*, (2011), provided data that there was poor adherence to guidelines and Kuwaiti diabetic patients lack of suitable dietary control/advice and failure to carry out glucose monitoring have resulted in an increase in disease morbidity. This may suggest more patient-centred care is needed.

The consequences of poor adherence to guidelines, a lack of dietary control and failure to routinely measure blood glucose, may require more patient episodes of acute care, which could need intensive medical/nursing care to return their condition to a more stable state. This lack of self-care behaviour was considered earlier by Al-Bustan *et al.*, (1997) who ‘hoped’ that diabetic education and better co-ordinated services in Kuwait could be achieved, but unfortunately, the later studies of Adsani *et al.*, (2008), Awad *et al.*, (2008), Al-Shaheen *et al.*, (2011), suggest this has not occurred.

The use of international guidelines to promote positive collaborative actions to both maximise the use of financial resources and to help patients control their diabetic state are examples which could be taken. However, this requires accurate data documentation of patient’s experiences to modify service delivery and so help prevent, control and mitigate the impact of diabetes through effective programs of research, training, education, and treatments, which even as recently as 2013 is still

lacking (Al-Taweel *et al.*, 2013). Evidence-based clinical practice has led to ‘tools’ being developed to measure prescribing adherence to national guidelines. These can both detect and measure inappropriate prescribing to specific patient groups by using quality standards extracted from evidence-based guidelines carried out by Kuwait physicians (Al-Taweel *et al.*, 2013). Similarly, no published studies have been reported for Kuwait evaluating dietary factors, which could be compared with guidelines used elsewhere in the world. Furthermore, patients’ experiences of their diabetes treatments in Kuwait have never received a detailed study.

In 2001 the KMOH produced a series of diabetes guidelines but no regular updates of such advice have been made (Al-Taweel *et al.*, 2013). Additionally, studies considering the adherence of these guidelines in Kuwait cannot be found in the literature. Such information would form the necessary analysis to produce a quality assurance framework to ensure optimal patient care as suggested by Al-Taweel *et al.*, (2013). These authors also stated that they found that International Guidelines, based on those used in the USA formulated by the American Diabetes Association, a summary of which can be found on their Website (Anon., 2013), were being used and an overall adherence to prescribing for diabetes according to such guidelines was 78%. This suggested that International prescribing guidelines for diabetes were being closely followed.

The KMOH is justifiably concerned that type 2 diabetes is a major health issue and related to abdominal obesity, hypertension, and atherogenic dyslipidemia which comprise severe metabolic complications (American Diabetes Association, 2003; Al-Sultan & Zanki, 2005). Further, obesity in Kuwait, may increase the risk of a large range of serious medical conditions such as cancer, osteoarthritis, coronary heart disease, gall bladder disease, hypertension and many others diseases (Jackson *et al.*, 2001). Contributory factors include: specific dietary elements, behavioural traits, and even social and economic factors have all been established to play some part in the increasing prevalence of health complications (Al-Isa, 1999). In research studies in Kuwait and other Gulf States it has been found that obesity is becoming increasingly common and approximately one third of adult Kuwaitis are obese. Recently in Kuwaiti men their mean BMI was 31.8 (+/- 6.3) and 28.5 (+/- 5.1) (Al-Sultan & Al-Zanki, 2005). This rating used BMI values of 30 or above as being considered

obese. Some studies have found a role for ethnicity associated with the prevalence of diabetes and some have found relationships with sex as well. The highest end of the spectrum of body fat distribution was seen in obese women with diabetes (Emara *et al.*, 1988). Some studies across the past decade have established an association between genetics/ heredity with the prevalence of both diabetes and hypertension (Abdella *et al.*, 1998; Al-Sultan & Al-Zanki, 2005).

In contrast, a limited number of studies conducted in Kuwait have revealed the severity of the diabetes problem and its 'rippling effects'. Research in two hospitals, Mubarak and Farwania, found type 2 diabetes has become more common in women over the age of 40, as compared to the increases across sex and age groups (Al-Sultan & Al-Zanki, 2005). Also, a positive relationship with family history/genetics has been found for 63% of patients Abdella *et al.*, (1996). A study in the Hawalli region found hypertension in 40% of all assessed diabetes patients, obesity in 47% and hypercholesterolemia in 23%. 42% of patients, although not obese, were categorised as being generally overweight (Sorkhou *et al.*, 2002).

Additional studies in Kuwait showed that a high diastolic blood pressure and serum triglycerides are a risk factor for the onset and progression of type 2 diabetes. Meanwhile, the metabolic syndrome complications as described above is capable of further involvement to a variety of serious health complications such as "abdominal heaviness" leading to potentially severe obesity, insulin resistance, an increased fasting glucose level, hypertension, a drastically reduced HDL-cholesterol levels and increased levels of triglyceride resulting in dyslipidemia (Palaniappan *et al.*, 2004, Al-Sultan & Al-Zanki, 2005). Some of the more recent progress improving the level of comprehension regarding the condition has occurred at the level of genetics, and the aforementioned metabolic syndrome.

The "*metabolic syndrome complications*" associated with diabetes has only been defined in greater detail in last decade, when the USA the National Cholesterol Education Program (NCEP) provided the first formal medical definition of this syndrome within its national guidelines to accompany its Adult Treatment Panel III report (ATP III) (NCEP, 2003). At present, the ATP III guidelines are the most modern and commonly utilised organisation of data in this subject area. However, there have been other developments by other organisations which are commonly

referred to such as the World Health Organisation's studies by Meigs (2002). The metabolic syndrome and associated issues as described by the ATP III guidelines 'demands' the presence of any three of the abnormalities of abdominal obesity, dyslipidaemia, a low level of HDL cholesterol, or the presence of blood pressure medication. More specifically, the existence of these abnormalities must fall within the range of a waist circumference measurement greater than 102 cm for men or 88 cm for women to constitute obesity, a serum triglyceride level greater than 150 mg/dL (or 1.69 mmol/L) to constitute dyslipidemia, a level of high-density lipoprotein (HDL) less than 40 mg/dL (or 1.04 mmol/L) for men and less than 50mg/dL (1.29 mmol/L) in women constitutes abnormally low levels of HDL. A blood pressure greater than 130/85 mmHg constitutes an abnormally high blood pressure or a fasting blood glucose level greater than 110mg/dL (or 6.1 mmol/L) thus needing medication (NCEP, 2003; Al-Sultan & Al-Zanki, 2005). Furthermore, ATP III emphasises the significance of treating diabetic patients and their metabolic syndrome complications in terms of preventing the more serious complications, such as cardiovascular disease or renal failure, which could be fatal.

The significance of treating cardiovascular complications to prevent a worsening of the patients' condition is emphasised in a number of studies, since these complications, which can be fatal even in non-diabetic patients, are frequently greater in diabetics (Isomaa *et al.*, 2001, Meigs, 2002; Ford *et al.*, 2002, Al-Sultan & Al-Zanki, 2005). In the USA, according to a national questionnaire assessment data, the prevalence of the metabolic syndrome is unusually high, as nearly 25%, suffer this condition. There is an increased occurrence in the elderly, especially in Mexican Americans (Marchesini *et al.*, 2004; Al-Sultan & Al-Zanki, 2005). Those suffering this syndrome double their probability of developing some form of cardiovascular disease, and in addition, are nearly four times as likely to develop type 2 diabetes in comparison with patients who that do not suffer metabolic syndrome.

Some studies, suggest the syndrome might have a genetic basis, whilst others consider a role for environmental factors which are conducive to increasing the risk in the onset of the syndrome (Marchesini *et al.*, 2004). Others have assessed the relationships between physiological anomalies, which are defined within the syndrome, and have concluded that the variables relevant to the metabolic syndrome are similar among the spectrum of ethnicities, unlike the prevalence of type 2

diabetes alone (Ford& Giles, 2003). Naturally, such a difference is of great interest to researchers and physicians, while this creates some immediate implications for areas such as prevention and preparedness in general (Ford& Giles, 2003). According to the United States' Third National Health and Nutrition Examination Survey, this syndrome (adjusted for age) was nearly 24% using the ATP III definition and 25% when using the WHO description. In other analyses the metabolic syndrome across type 2 diabetic patients was found to be 81% and 78% using the descriptions developed by the WHO and the ATP (respectively) (Ford & Giles, 2003; Al-Sultan & Al-Zanki, 2005).

Other factors relevant to type 2 diabetes and the metabolic syndrome provide a further insight into the prevalence of the condition. Isomaa *et al.* (2001) outlined that the metabolic syndrome had been increasing to 7 %, 43%, and 42% across the age groups of 20 to 29, 60 to 69 years, and less than or equal to 70 years (respectively). Isomaa *et al.* (2001) also discovered that the occurrence of this syndrome increased at a comparable rate for both sexes (24% rate of increase in men and a 23.4% rate of increase for women) while the metabolic syndrome was especially common among women of African-American ethnicity. Two years later Meigs *et al.* (2002) found that the metabolic syndrome affected 20 to 30% of middle-aged adults across the United States, and this was true across a variety of age groups, genders and ethnicity. This further supports the suggestion that while the ethnicity statistics with regards to diabetes prevalence may vary greatly, the occurrence of metabolic syndrome criteria as described by the ATP III and WHO criteria is a better index of the scale of the problem.

With specific emphasis to Kuwaiti residents, a recent national study revealed that the metabolic syndrome criteria were found in 34% of patients suffering from hypertension. Males numbered 55% and females 45% in which 28% of patients were in range 40 to 55 years, and 42% of residents were over the age of 55 years (Sorkhou *et al.*, 2002). In Oman Geographically near to Kuwait, research demonstrated 21% of the total population - 19.5% of men and 23% of women were affected by the metabolic syndrome. The same study, conducted by Al-Lawati (2003), severe abdominal obesity was much higher in women than men, 44 % as compared to 5%, respectively.

Returning to Kuwait, in 2005, Al-Sultan & Al-Zanki (2005) conducted another thorough and comprehensive study providing useful statistical information specific to type 2 diabetes and its prevalence in Kuwait. This study is extremely relevant for the purpose of this literature review. The Hawalli health centre served as the primary source of data collection, as it provides health care services to 160,000-180,000 Kuwaiti residents. In 2005, the time of their study, the facility served exactly 162,116 Kuwaiti residents. Today, due to population growth since 2005, the facility is currently attempting to serve an even greater number of residents, (Al-Sultan & Al-Zanki, 2005). The Hawalli health centre provides extensive services to diabetes patients, and so is a prime location for research efforts attempting to discover relationships or compile statistics relevant to diabetes prevalence, treatment, or relationships with other health complication.

Clearly, the complications associated with type 2 diabetes and with their range of severity, have not been fully researched in Kuwait.

Al-Sultan & Al-Zanki's (2005) assessment of select samples in Kuwait revealed some interesting trends and statistics. In terms of the fundamental data they collected, the basic prevalence of diabetes across an observed sample is as shown in Table 1.2.

Table 1.2 Diabetes prevalence across the age groups and sex of Kuwaiti and non-Kuwaiti residents (source: Al-Sultan and Al-Zanki, 2005)

Age group	Men (n=142) n (%)	Women (n=114) n (%)	Total (n=256) n (%)
Kuwaiti	28 (10.9)	53 (20.7)	81 (31.6)
20 - 39 years	3 (1.2)	5 (2)	8 (3.1)
40 - 59 years	16 (6.3)	25 (9.7)	41 (16)
60 + years	9 (3.5)	23 (9)	32 (12.5)
Non Kuwaiti	114 (44.5)	61 (23.8)	175 (68.4)
20 - 39 years	17 (6.6)	53 (20.7)	24 (9.4)
40 - 59 years	76 (29.7)	61 (23.8)	112 (43.8)
60 + years	21 (8.2)	18 (7.3)	39 (15.2)

Table 1.2, shows the distribution of type 2 diabetes according to sex, age group in Kuwaiti and expatriate citizens i.e. non-Kuwaitis. For male Kuwaitis, the age range was between 36 and 71 years and for women between 33 and 73 years. Their median age was 48 years for men and 57 years for women. In contrast, the non-Kuwaitis had a wider age range as it was between 23 and 84 years for men and 29 to 84 years for women. Expressed as a median value this was 49 years for men and 53 years for women. The various ethnicities included as non- Kuwaiti's were 70% 'Arabian' including people from Egypt, Syria, Oman, Iraq, Palestine, Jordan and Saudi Arabia and 30% were from Iran, India, Sri Lanka, Philippines, Bangladesh, and Pakistan. The non-Kuwaitis mean age was 51.7 years and their mean duration of diabetes was 6.1 years (plus or minus 5 and a half years) with an overall range duration of zero to 22 years (Al-Sultan & Al-Zanki, 2005).

Numerous 'factors' relevant to health have been related to the onset, development, and severity of type 2-diabetes, and these are given in Table 1.3.

Table 1.3 Personal 'traits' and relevant medical background of subjects used in a study of diabetes as abstracted from Al-Sultan and Al-Zanki (2005).

	Kuwaiti men n (%)	Kuwaiti women n (%)	Non- Kuwaiti men n (%)	Non-Kuwaiti women n (%)	p value*
Family history of diabetes mellitus	19 (67.9)	43 (81.1)	48 (42.1)	32 (52.5)	0.000
Smoking	10 (35.7)	4 (7.5)	44 (38.6)	2 (3.3)	0.000
Dieting	11 (39.3)	37 (68.8)	61 (53.5)	44 (72.1)	0.005
Exercise	7 (25.0)	7 (13.2)	25 (21.9)	10 (16.4)	0.441
Obesity (BMI >30)	10 (35.7)	37 (71.2)	31 (27.2)	36 (59)	0.000
Obesity WC > normal	12 (44.4)	48 (96)	47 (41.2)	49 (87.5)	0.000
Obesity WHR > normal	3 (60.0)	28 (82.4)	45 (64.3)	36 (73.5)	0.295

Hypertension	14 (50.0)	30 (56.6)	45 (39.5)	30 (49.2)	0.191
IHD	3 (10.7)	14 (26.4)	5 (4.4)	11 (18)	0.001
Hyperlipidemia	11 (39.3)	32 (61.5)	42 (36.8)	31 (50.8)	0.019

Key Please note - the authors did not describe whether this measure of evidence against the null hypothesis was in relation to one or both categories listed in the columns, they asserted that a value of $p < 0.05$ for any category (in the rows) was deemed significant (Al-Sultan & Al-Zanki, 2005).*

Table 1.3 although it is published in the literature is rather misleading as it contains numerous calculations errors when absolute numbers are calculated as a percentage. Because this is a very important table to use for this thesis I have calculated the real percentage figures and inserted them in a new table shown below as Table 1.4. The corrected are shown in blue.

Table 1.4 Personal ‘traits’ and relevant medical background of subjects used in a study of diabetes by Al-Sultan and Al-Zanki, 2005 with re-calculated percentage figures shown in blue.

	Kuwaiti Men (n=28) n (%)	Kuwaiti Women (n=53) n (%)	Non-Kuwaiti (men=114) n(%)	Non-Kuwaiti women (n=61) n(%)	p value
Family history of D.M.	19 (67.9)	43 (81.1)	48 (42.1)	32 (52.5)	0.000
Smoking	10 (35.7)	4 (7.5)	44 (38.6)	2 (3.3)	0.000
Dieting	11 (39.3)	37 (69.8)	61 (53.5)	44 (72.1)	0.005
Exercise	7 (25.0)	7 (13.2)	25 (21.9)	10 (16.4)	0.441
Obesity (BMI >30)	10 (35.7)	37 (69.8)	31 (27.2)	36 (59)	0.000
Obesity WC > normal	12 (44.4)	48 (96)	47 (41.2)	9 (80.3)	0.000

Obesity WHR > normal	3 (10.7)	28 (32.8)	45 (39.5)	36 (39.0)	0.295
Hypertension	14 (50)	30 (56.6)	45 (39.5)	30 (49.2)	0.191
IHD	3 (10.7)	14 (26.4)	5 (4.4)	11 (18)	0.001
Hyperlipidemia	11 (39.3)	32 (60.4)	42 (36.8)	31 (50.8)	0.019

Key* number of Kuwaiti men = 28 and number of Kuwait women = 53 number of non-Kuwaiti men = 114 number of non-Kuwaiti women = 61 .WC = waist - circumference, WHR= waist hip ratio, IHD = ischemic heart disease.

As can be seen from Table 1.3, the corrected version of the data shown within Table 1.4, for men, smoking is more common, and dieting less common, and exercise was only present in 25 % of the patients. Their family history and the role of genetics were also relevant in this recent analysis as Kuwait people proved to be more commonly affected ($p < 0.000$). Similarly, obesity, as according to the body mass index higher than or equal to 30, was found in 50% of the Kuwait patients but not the expatriates. The overweight, but not obese, patients were over 30 percent of the group so being overweight to some degree was found in nearly 80% of the patients (Al-Sultan & Al-Zanki, 2005). For the group, the female mean BMI value was 32.56 kg/m^2 (range 5.85 kg/m^2) and 27.83 kg/m^2 (range of 4.84 kg/m^2) for men. The waist-hip ratio or the general waist circumference found higher than normal values of waist circumference, greater than 102 cm in men and 88 cm in women in over 63 % of the observed population. The waist to hip ratios were greater than 0.95 for men or greater than 0.80 for women in over 71% of the patients. Patients in ethnicity and gender, obesity in terms of waist circumference in Kuwaitis by Al-Sultan & Al-Zanki (2005) who found it to be 93%, 41%, 78%, and 57% respectively across the female sex, the male sex, the Kuwaitis, and expatriates. They established a clear relationship between waist circumference, gender and nationality. Obesity in terms of the waist to hip ratio in type 2 diabetics in Kuwait was 77% for females, 65% for males and 80% across Kuwaitis, and 69% across non-Kuwaitis (Al-Sultan & Al-Zanki, 2005).

Other relevant factors for type 2 diabetics in Kuwait were that 47% had a previous history of hypertension, 13% suffered hyperlipidaemia and 46% ischemic heart

disease. Such determinants were further related to gender and residency as listed in Table 1.3.

In males, smoking has been closely linked with the prevalence of type 2-diabetes, and 39% of non-Kuwaitis and 36% of Kuwaitis currently smoke. For females, the most closely associated trait was a genetic predisposition, in over 80% of the observed Kuwaitis, in 50% in the non-Kuwaitis and eating habits found in nearly 70% of Kuwaiti and over 70% of non-Kuwaiti females. Women were more likely to exhibit multiple factors: obesity in terms of body mass index, waist circumference ratios, hypertension, hyperlipidemia, and ischemic heart disease (Al-Sultan & Al-Zanki, 2005). Table 1.5 shows the biochemical characteristics they considered:

Table 1.5 Summary of biochemical findings in type 2 Diabetics in Kuwait (Al-Sultan and Al-Zanki, 2005).

	n	%
<u>HbA1c*</u>		
Normal	10	4.5
Goal	29	13.1
Acceptable	35	15.8
Unacceptable	148	66.7
Total number of patients for which data was available	222	86.7
<u>Total Cholesterol</u>		
Normal	123	52.3
High	112	47.7
Total	235	91.8
<u>Triglycerides</u>		
Normal	172	72.9
High	64	27.1
Total	236	92.2
<u>HDLCholesterol in women</u>		
Normal	41	39.8
Abnormal	62	60.2
Total	103	90.4
<u>HDLCholesterol in men</u>		

Normal	90	68.7
Abnormal	41	31.3
Total	131	92.3
<u>LDLCholesterol</u>		
Normal	67	28.6
High	167	71.4
Total	234	91.4

*Key *Male and female values were added together for this part of the table.*

Data from recent Kuwait studies of type 2 diabetic patients provides much 'food for thought' for the present and future studies.

Firstly, the result of Al-Sultan & Al-Zanki's (2005) analysis indicate that a genetic predisposition and obesity are highly relevant components and major potential risk factors which are commonly found in the sample population agreeing with the results of Abdella *et al.*, (1998), and Jackson *et al.*, (2001). Meanwhile, Al-Sultan & Al-Zanki's (2005) reveals how hypertension, ischemic heart disease, and hyperlipidemia are more common in the female population of diabetic patients in direct comparison to their male counterparts. Much of this is supported by the work of American Diabetes Association (2003), as the stringent maintenance of blood pressure is strongly encouraged for any patient with diabetes. Obesity is common in the Kuwait population, as nearly half of the entire sample and considerably over half of the observed females were obese. Al-Sultan & Al-Zanki (2005) postulated that the prevalence of female obesity, as compared with their male counterparts, may be a direct result of their lifestyle differences. Kuwaiti females do less physical activity, the speed of modernisation, general affluence, rapid rates of food consumption, and elements of a sedentary lifestyle (Al-Isa, 1997; Abdella *et al.*, 1998; Al-Sultan & Al-Zanki, 2005) may all contribute. Other analyses have revealed comparable conclusions across the Kuwait population, while the study conducted by Al-Muhailan *et al.*, (1989) revealed that diabetic females were also more prone to being obese than males, and their numbers increased with age. Additionally, the tendency for Kuwaiti diabetics to be obese was higher than the averages of other nations assessed across the world (Al-Isa, 1997).

The Hawalli diabetic patients were formally assessed within the specific health care facilities (Al-Sultan & Al-Zanki, 2005). According to Abdella (1995), the mean age was 53 ± 14 years and they had a mean duration of diabetes of 7.8 years, with a range between 2 and 28 years, comparable to the studies of Al-Sultan & Al-Zanki (2005). Both analyses showed a positive correlation between genetic predisposition and prevalence, with an immediate family relation was documented in over 66% at the time of Abdella's (1995) analysis. Finally, he found that female Kuwaiti patients exhibited a BMI of $31.8 \pm 6.3 \text{ kg/m}^2$ and $28.5 \pm 6.3 \text{ kg/m}^2$ for men. The prevalence of hypertension in both male and female diabetic patients was found nearly 15%.

Analyses using adjacent countries to compare with Kuwait show the prevalence of overweight or obese females is evident within all these nations, so this problem is not exclusive to Kuwait. It is not just an Arabic problem as in 2000, Chiu's study of Taiwanese patients showed women had a greater BMI than males, and the prevalence of overweight/ obese patients was 30 % for males and over 40 % for females (Chiu, 2000).

Clearly, the recent findings in diabetic research enable physicians to maximise their awareness that the objectives of the treatment for diabetes should include not only the control of the inherent glucose complications and instability, but many other factors as well. Since obesity is a major factor for control in diabetes Sorkhou (2002) further recommended that appropriate action should be taken to inform the Kuwaiti people of all potential "precursors" of diabetes and how to control these 'factors'. Cardiovascular disease, one of the most harmful effects of severe diabetes, is the leading cause of death in Kuwait, thus adding to the urgency for such awareness (Sorkhou, 2002). Finally, Al-Sultan & Al-Zanki (2005) reported that over 66% of his sample, had an unsafe level of glycated haemoglobin (HbA_{1c}). The level was higher in the expatriate group than for the native Kuwaitis, especially in the males. Consequently, these researchers strongly recommended all health employees should realise the significance of diabetes awareness for all the Kuwaiti population through educators and educational programs. Additionally, physicians should be aware of the prevalence of all known existing risk factors of type 2 diabetes and cardiovascular disease, and should also understand that relationship to, and elements of, the development of the adverse metabolic syndrome needs addressing.

Literature Review

1.15 Published papers relevant to Kuwait – an in depth analysis.

This analysis was designed to determine type 2 diabetes treatment within the overall health care system of Kuwait over the last two decades. The studies are considered in chronological order.

The first paper is by Al-Bustan *et al.*, (1997) entitled '**Socio-demographic features and knowledge of diabetes mellitus among diabetic patients in Kuwait**'.

Although the data was collected between 1995-1996 and is now twenty years old it was still thought appropriate to review it since their data may still be of value and interest.

This study was made on 760 patients, with approximately equal numbers of Kuwaiti and non-Kuwaiti patients. They studied demographics, physical and laboratory values analysed by both parametric and non-parametric tests using SPSS. They determined the 'social demographic' profile plus patients' knowledge scores about their symptoms, nature of the disease, treatment(s), as well as possible diabetic complications. The study was a cross-sectional survey of 760 patients as they attended their diabetic clinics in 1995-96. Knowledge assessment was done indirectly through the capacity to correctly interpret and understand a questionnaire. The study identified little disparity of the Kuwaiti's knowledge of diabetes as compared to the non-Kuwait residents. The 'knowledge score', for Kuwaitis was 66% and 64% for non-Kuwaitis. These scores were derived from questions about a) the type of disease that diabetes is considered to be, b) the symptoms of diabetes and c) hypoglycaemic symptoms. Their analysis used the then contemporary statistics where p values were expressed in terms of < 0.05 , < 0.01 and < 0.001 . Of the 35 questions about diabetic knowledge both Kuwaiti's and non-Kuwaiti's obtained identical scores of positive knowledge (n=15) on topics such as increased appetite, increased thirst, passing of large volumes of urine, frequency of urination and that poor control of the disease results in diabetic complications. For some questions (n=15) the Kuwaiti's knew significantly more than the non-Kuwaitis about: the fatigue the diseases causes, the relative values of food such as potatoes and rice and that blood sugar increases in

uncontrolled diabetes. The non-Kuwaitis had a better knowledge score in three areas: the loss of body weight, avoidance of smoking and rice is a carbohydrate.

From the socioeconomic and demographic data no gender differences in terms of duration of their diabetes (years) were found and the majority were on 'drug only' treatments. 17.2% of patients' were using insulin with more Kuwaiti males (20.2%) using this therapy. No differences existed between the sexes, physical activity and BMI of the two groups. The finding that many patients lacked a basic knowledge of their disease positively correlated with their level of education ($p < 0.001$).

If this study was to be repeated today perhaps more detail as to how the statistical tests were actually carried out and a statement made about a parametric or non-parametric correlation test would be provided. The patients' illiteracy was a point of interest and the authors devised a classification of four levels of education for the study: illiterate, primary, secondary and university. No verification in the study was made for the subjects to show their level of education by actually asking people to perform a task so allowing an assessment of their literacy. They simply took a patient's educational background to assess literacy which is very difficult as simple educational attendance does not ensure literacy. It was concluded that Kuwaitis had a higher level of illiteracy than non-Kuwaitis and they recommended the establishment of a standard diabetes education system in Kuwait to produce desirable outcomes.

Some areas of bias do exist but as compared to many of the other studies these are very limited. One area of comment is that patient selection was merely described as 'basically random'. This leads to uncertainty about how patients were actually selected which is the key to the success of any study.

The second paper was by Al-Adsani *et al.*, (2008) entitled '**Evaluation of the impact of the Kuwait diabetes care program on the quality of diabetes care**' was a joint investigation between the Kuwait Ministry of Health and the Department of Medicine at the Al-Sabah hospital in Kuwait. The study assessed how a Diabetes Care Program introduced in September 1999 had progressed in the years 2001-2003.. Data from September 1999 acted as the comparative control data.

Of great interest and relevance to the studies reported in this thesis was the ways in which the data was gathered. The data was solely based on the examination of 250

medical records - 50 from each of the chosen health regions of patients who had attended between October/September in each year studied. These were compared to the national guidelines for the care of diabetic patients. Over the five study periods the patients' files had become more organised and structured from 60-100% ($p < 0.001$). The prevalence of smoking assessment, eye and foot examination increased significantly from 2.8 to 27.2% ($p < 0.001$), 2.4 to 31.6% ($p < 0.001$) and 0.4 to 40.4% ($p < 0.001$) respectively. For microalbuminuria the figures were 4.4% to 26.4% and for HbA_{1c} levels the values were 10.4 to 60.8% ($p < 0.001$). They concluded that the national diabetes educational programme had resulted in some successes but required continuous development to further improve diabetes care.

These findings suggest that the policy to achieve better patient outcomes was working in 2008. The programme achieved some of its major objectives using medical records as the research tool. A comparison of the findings of the four cycles of audit in 1999, 2001, 2002, and 2003 in 21 centres, showed an improved organization from 60% to 100% in the structure of the patient files as more data was being recorded in the later files than in the earlier ones. Another improvement was the rise in rates of recording patient demographic/medical /treatment details - by improvements in the filing system, increased feedback to the physicians on the importance of documentation being always added to the records. This is shown by the rates of comprehensive data present in the files in 1999 was 38.6% and in 2003 it was 95.6%. Their data suggest that these interventions as part of the national diabetes programs were effective in developing a better standard of diabetes care for patients.

The National Diabetes Programs (NDP) had been effective in increasing knowledge, so improving primary health care for diabetes patients in the country. The support by the authorities within the health care sector, provision of manpower resources, the continuous monitoring process and evaluation as well as general awareness or education to the public were among other features identified as improving diabetes care within Kuwait. However, this study suffered critical shortcomings in that proper control groups were absent, random sampling of patients was not used, the questionnaire actually used was missing from the published paper and their electronic filing systems were not clearly described. Moreover, the study failed to study the impact of the diabetes care programme on the possible outcomes that would have resulted from a greater involvement of physicians, dieticians and

diabetes nurse educators in the NDP. The correlation of patients' files and experience was therefore impossible and may have led to bias in the results.

The study also considered some of the administrative care changes implemented to try and improve patients' care. The number of patients using an appointments booklet, first mentioned in the 1999 baseline study did not change over the four year period used with no statistically significant differences being found over the four year study period as patient adherence to their appointments was 73% in the final year remaining unchanged since 1999.

The study found marked improvements in the patients' files in terms of their structure and organisation. In 1999 this was 60% adequate but in 2003 had significantly improved to 100%. Likewise for patients' identification data, in 1999 it was 38.6% and in 2003, 95.6%. In 1999 laboratory sheets recording the values for clinical tests were only found in 28.9% of patient files whereas in 2003 this increased significantly to 91.2%. Finally and very interesting for my PhD thesis was the finding that in 1999 only 41% of prescriptions were located in the correct place whereas in 2003 it was 100%. This will mean that when I examine the files I will have confidence that the patient medication records will be complete.

Paper number 3 written by Al Adsani *et al.*, (2009) was entitled '**The level and determinants of diabetes knowledge in Kuwaiti adults with type 2 diabetes**'.

This was carried out exclusively by native Arabic speakers based in Kuwait and was designed to determine diabetic patients' knowledge of their disease. They studied 5114 Kuwaiti patients, all over 30 years of age, using the widely accepted 'tool' and widely validated Michigan questionnaire. This is exactly the same method to be used in my thesis. Perhaps the most interesting finding was that only 29% of the patients performed glucose monitoring at home. Their average HbA_{1c} level was $8.76 \pm 2.3\%$ comparingly unfavourably with the international values for good control- below 7%, acceptable between 7-8% and poor above 8%. Consequently 25% of patients' blood sugar control was poor but they found that 24.5% of the patients did have good glycaemic control with the other 50% had variable control.

The overall level of knowledge, using the diabetic knowledge test (DKT), of the 5114 patients who took part in the study was $58.9 \pm 22.1\%$. The DKT was divided,

into two subsections namely, a general knowledge subscale and an insulin knowledge subscale. They used 23 questions, 14 in the first and 9 in the second section. The first, the general knowledge section asked questions about diabetes which the authors rated as being poor when the score for correct answers was less than 7, average 7-11 and good when greater than 11. In the second part related to insulin use the scoring system for this section- poor was less than 5, average was 5 to 7, and good was greater than 7.

The overall total knowledge score (TKS) was calculated out of 23. For males the mean score (\pm S.D) was 13.6 ± 3.4 and for females 13.6 ± 3.2 . When this total numerical score is expressed as a percentage of the total possible correct answers (100%) the males score for correct answers out of 23 questions was 59.1% which curiously in the text is expressed as 58.9%. They then transformed the actual scores in each of the two sections into percentage values using 14 for the first subscale and 9 for the second subscale and found the general knowledge subscale mean score was 61.6% and for the insulin subscale was 54.7%. However when I attempted this calculation with their data shown in Table 3 the figures were 61.4% and 62.5%. These figures were made more complicated by the statement that only 9.7% scored “good” in the total test and 6.1% scored “good” in the tests about insulin knowledge. These values were very difficult to calculate from the data provided.

The paper contains interesting data about the drugs these patients were using. For example, 58% were taking oral hypoglycaemic agents, 20% were only using insulin and the remaining 22% used both oral agents and insulin. Of special interest was the median duration of insulin therapy was four years, with the majority using insulin twice a day, injected either by themselves or 37% actually attended a clinic for their injections. The study found knowledge about diet and self-care lacking, which was age related, as the older patients knew less about their condition.

The final aspect of the study was that the HbA_{1c} values, suggested poor blood sugar control mirrored perhaps by 39% having a single complication of the disease, 12.8% having two complications and 4.4% having three or more complications. This poor degree of blood glucose control might have been expected to cause more complications than it actual did, as the evidence is available that precise control minimizes the complications of the disease.

The paper was a good summary of the level of diabetes education in Kuwait but the results fail to capture possible statistical differences between men and women since all the results were reported as a single group. The full questionnaire was not presented but only selected examples. Possible sources of bias included: not checking their data with the patients' medical files, the lack of a random choice of patients, the use of five different laboratories for their HbA_{1c} analyses and the lack of a statement about how samples were double or triple checked for accuracy. The Michigan questionnaire clearly determined the knowledge, opinions, behavior and the practice of self-management of the diabetic condition in Kuwaitis.

The fourth paper, by Awad *et al.*, (2011) was entitled '**Diabetic patients' knowledge of therapeutic goals in Kuwait**' written by the Department of Pharmacy Practice, University of Kuwait in Jabriya in February to May 2008 but actually published in 2011. The study analysed data from 247 diabetic patients in six Kuwait diabetic clinics.

Data collection was made by face-to-face interviews using a pretested questionnaire of patients understanding of diabetes via open and closed questions. The validity of the questions was established in 15 diabetic patients and data analysis used simple cross-tabulations and logistic regression analysis (SPSS software, version 17). One researcher collected all the data using a face-to-face technique. Unfortunately, it was not stated how randomization was achieved and the actual question used were not shown. A feature of the study is that non-Arabic speaking patients were also included in the study which necessitated the questionnaire being made available not only in Arabic but in English, fortunately the language it which had been originally written to develop their original ideas. The paper does not explain who these English speaking patients actually were and some data is expressed, for example family history of diabetes, collectively. The majority of the patients were non-Kuwaiti, (n=174) as only 73 Kuwaitis took part. A family history of diabetes, in 190 patients and for Education, Low/intermediate (n=147) and high (n=100). The majority, 58%, of patients were male. For analyses all the patients were grouped together which makes any sex-related differences between the populations impossible to determine. Consequently, comparisons with the earlier studies made purely on Kuwait nationals difficult to interpret.

They measured HbA_{1c}, and also measured the low and high density lipoprotein levels as was done in the studies of Al-Adsani (2008) and Alshaheen *et al.*, (2011), the only other studies which made these measurements. They also recorded drug histories, family history and patient knowledge of their disease. The last feature was of especial interest for the purposes of my planned study.

Data analysis found that 160 out of 247 patients were on oral medications - 96 with monotherapy, 64 taking two or more drugs. Insulin was used as monotherapy in 29 patients (12% of the patients) and 58 patients, 23% were receiving both oral medications and insulin. The authors expressed disappointment that even in 2008 [when the study was actually carried out] many of the target goals had not been met. Only 5% of the patients knew about the target value of HbA_{1c} and for lipoproteins levels only 2% understood its significance, contrasting with 43% who understood the relevance of blood pressure as a target goal in their treatment.

In contrast, 60% understood the target goals for fasting and 47% understood post prandial blood glucose target levels. The study found that women aged 50 or above had a significantly poorer knowledge ($p < 0.001$) as compared to males. The poor knowledge about HbA_{1c} and therapeutic goals led the authors to suggest a change to current drug prescribing/education was necessary.

Unfortunately, this data was not correlated by examining patients' files and this may have led to bias in the results as some of the data required the patients to have knowledge of their clinical data such as being asked to describe their recent levels of LDL-C. If their notes had been examined verification of any values they suggested would have made the data more accurate.

The fifth paper, Alshaheen *et al.*, (2011) was entitled '**Monitoring the standard of health care of diabetes mellitus type 2 in a primary health care setting**'.

This research at the Al-Yarmouk Health Centre, Kuwait combined researchers from the KMOH and the Faculty of Medicine, Alexandria University, Egypt. This makes the study rather unusual as it had direct KMOH involvement.

Although the study did not specifically focus on patients' experience of their treatment, dietary advice and exercise, it contained some unique findings about aspects of renal and ocular care of these diabetics.

The study followed 200 patients for a period of two years using the parameters of glycated haemoglobin (HbA_{1c}), microalbuminuria, low density lipoproteins, regular eye examinations to assess their diabetic condition.

A complicating factor of this study, similar to the other papers which had cited their analysis being made using both Kuwaiti and non-Kuwaiti nationals was that direct comparisons with the other studies, which had exclusively used Kuwaiti patients, was very difficult. However, they found, as had previous ones, that the majority of patients, 46.5% were males and 53.5% females, had a mean age 51.2 ± 8.8 years. 46.7% were below 50, 38% for the group 50-59 and 15.3% above 60 years. At the start of the study, 31% of the total group (n=62), both males and females, had an HbA_{1c} value below 7%. Over the study period, 56.1% improved their HbA_{1c} levels, microalbuminuria, fundus examination and LDL level only 2.3% had deteriorated. The study found clear benefit in providing patient education on their urinary output of microalbumin, suggesting an improvement in their renal complications of their disease. Only 2.3% of the group suffered a decline in their renal function as measured by this urinary value. The study found nationality, age, sex were associated with the levels of adherence. Non-Kuwait nationals were 56% of the respondents and over two years their adherence levels improved from 7.5% at the start to 24.6% at the end. Kuwait residents recorded higher levels of adherence as compared with non-Kuwait residents.

This study had some points of weakness as the patients were not randomly selected and all came from only **one** diabetic clinic in Kuwait and the experiences at one clinic may not be a fair representation of all the clinics in Kuwait. However, the overall findings suggest that the administration of standard care had the capacity to significantly ($p < 0.001$) improve levels of adherence to eye examination, renal excretion of albumin and HbA_{1c} levels in Kuwait.

The next paper is by Al-Taweel *et al.*, (2013) is entitled **‘Evaluation of adherence to international guidelines for treating patients with type 2 diabetes mellitus in Kuwait’**,

This was a retrospective study which analyzed 652 medical records of type 2 diabetics, held in four secondary care centres (out of a total of five in the country)-80 records being examined per centre, (n=320) and also in 8 primary care centres (total

number of records n=332). They used a validated 43-criterion **medication assessment** tool which they described as 'MATKW' later to be called MAT_{KW}, which studied the cardio-prevention and treatment of diabetic patients in the period January -June 2010. They omitted to state who had actually obtained the data for this study which was analysed using SPSS (version 17) for the Mann Whitney U test showing their assumption of non-normally distributed data without actually doing a normality test. All the data was compared to graded standards by an independent panel of seven experienced consultant endocrinologists from primary and secondary care.

Data analysis found that 90.6% of patients in the primary care centres used metformin and in the secondary care centres it was 86.3%. In contrast to metformin the thiazolidinediones were restricted to the secondary care units. Curiously, although the combination of insulin and oral therapy is mentioned in the text as being found in 41.6% (n=271) of the patients, this data is missing from their relevant table, Table 2 in the text. Perhaps this can be explained as the focus of the study was on the cardiovascular drugs the patients were taking rather than, to use their terminology, 'diabetes-control specific criteria'. Other criteria, which the study did not include data on individuals' renal function, exercise and weight loss strategies, all of which would have been suitable for study about cardiovascular disease. The inclusion of a figure of 1.1% (n=7), again only found in the text, for the use of insulin for the treatment of type 2 diabetes is of interest for my thesis as are the lack of renal values, weight loss strategies and exercise routines.

The authors investigated the levels of adherence to the predefined clinical guidelines, for the treatment of type 2 diabetes, in primary and secondary levels of health care provision within Kuwait for Kuwaitis. The study used a specific, well-developed, validated research tool based on international standards at twelve diabetic clinics in four regions in Kuwait. The study focus was the number of times practitioners adhered to the predefined international guidelines while prescribing medication for diabetes. Among the respondents, 77.7% recorded a prompt adherence to the standard international guidelines. Disparities concerning the primary and secondary systems were found since higher adherence was found in the secondary level. Patient documentation and poor record keeping was suggested as being in need of urgent attention. The study recommended the adoption of better, improved, multifaceted and cost effective prescribing tools as well as in decision-making:

... *“Further qualitative studies to allow a comprehensive understanding of the factors associated with the specific problems identified by this study, and cost effective multifaceted interventions are highly needed to secure the quality of diabetes management in the healthcare setting of Kuwait” ... (Al-Taweel et al., 2013).*

The use of scientific designed tools for data collection and analysis showed strategic strengths but there were some weaknesses. For instance, the MATKW was used in collecting the information but in the event of a breakdown, then important information could be lost. Further, the use of MATKW and SPSS both require technical know-how and facilities so operators of the systems must be conversant with them before adopting them for routine use. Poor information and training in the use of this software may produce errors so being detrimental to any final decisions which had to be made.

Finally, there were four potential points of bias in the study. Namely, a) they only examined patients' medical records and did not attempt any sort of correlation with patients' actual experience, b) the actual audit questions given in the text is incomplete, c) basing any analysis solely on medical records which they describe as having been revealed as 'incomplete documentation of patients' records' may seriously bias the final analysis and d) patient selection was not random, and would have added great strength to the study.

1.16 Overall conclusions from the available literature and studies to be addressed in this thesis.

Diabetes is clearly a major medical problem in Kuwait and its current treatment should be study to determine if any potential enhancements could be made. The existing data is somewhat variable and further investigation is needed to clarify the exact current position. Also, one important aspects of type 2 diabetes data concerns renal problems and eventual renal failure and its problems and consequences which needs clarification by recent data, as only one 2005 study by El-Reshaid *et al.*, (2005), reported a prospective study on chronic renal disease in Kuwait, where 24% of patients (n=271) with chronic renal failure had diabetes mellitus as the main aetiological factor.

This thesis proposes to using conversations/interviews with patients and physicians' and the examination of patient notes to determine the experiences of diabetic patients'/physicians/medical notes, to establish the adherence to guidelines for treating type 2 diabetes mellitus. Further aspects of the renal disease brought about by diabetes and dietary advice as a resource to help them in their day to day nutritional support were also to be investigated.

1.17 Research hypothesis.

The Oxford English dictionary defines a hypothesis as:

'A supposition or proposed explanation made on the basis of limited evidence as a starting point for further investigation' (Oxford dictionary language matters, 2016)

Consequently, using this definition, the overall hypothesis on which this study was based is:, on the basis of limited evidence in the literature the supposition is that current quality of care of type 2 diabetes in Kuwait may be capable of enhancement.

This scientific hypothesis will represent the predicted relationship among the variables being investigated and the null hypothesis represents a statement of no relationship among the variables being investigated. To obtain support for the scientific hypothesis the evidence will be collected which enables the experimenter to reject the null hypothesis. So support for the scientific hypothesis is always obtained indirectly by rejecting the null hypothesis. So if the null hypothesis can be rejected by the evidence obtained there is evidence to support the scientific hypothesis (Christensen, 2004).

To explore the hypothesis, three specific questions have been formulated:

Research Question 1: *"What do type 2 diabetic patients/ physicians currently experience in Kuwait in the diagnosis and treatment of the patient condition". This should enable the abilities, capacity, effectiveness, and challenges posed to the nation's facilities and professionals in their ability to treat diabetes to be determined.*

Research Question 2: *"Can any of the issues described by diabetic patients and their physicians be better addressed in the future, and what specific areas should be the subject of further research?"*

Research question 3: *Do patient notes provide an accurate research tool for the analysis of treatment strategies of type 2 diabetes patients in Kuwait?*

This under-researched subject of diabetes in Kuwait, was considered to be worthy to be studied for a PhD for the following reasons:

- It will generate new, up-to-date data about the disease in Kuwait.
- It will study the way the disease is currently both diagnosed and treated.
- It will allow comparisons of treatment to be made with International Guidelines
- It will study renal problems caused by type 2 diabetes and their treatment in Kuwait.

1.18 Aim and Objectives of this thesis.

Aim.

This study will examine the current treatment experience of type 2 diabetes in Kuwait, in patients/physicians attending diabetic clinics and hospitals, by determining their experiences, awareness and attitudes to their diabetic treatment in conjunction with their medical records. Additional considerations was to be given to diabetic patients with kidney disease.

Objectives.

The objectives of this study were to:

- a) find, study and critically assess the current literature relevant to diabetes with special reference to Kuwait
- b) compare current type 2 diabetes treatments used in Kuwait, against international norms in developed nations
- c) assess patient experiences of type 2 diabetes in Kuwait, enabling any areas of strengths and weaknesses to be established
- d) examine the patients suggested improvements for the reduction of barriers, which complicate their treatment
- e) examine the complications of renal problems in type 2 diabetics

f) formulate strategies to minimise renal complications in diabetic patients in Kuwait

g) examine the opinions of physicians with regards to the standards of care currently in Kuwait.

Chapter 2

2 Methods and study design.

2.1 Overview.

This research used a combination of both quantitative and qualitative methods following the advice of WHO that useful research in the health sciences can be both qualitative and/or quantitative in nature (WHO, 2001). This mixed method of analysis enables any study to obtain the strengths and offset the weakness, found in both qualitative and quantitative methods (Tashakkori & Teddlie, 2008; Cresswell *et al.*, 2011). This research can be qualified as exploratory, rather than confirmatory, in view of the very limited number of previous studies specifically made in Kuwait. This approach is both inductive and deductive, involving certain measures of expectations requiring deduction from theoretical premises tested with the collected data.

One technique is to use the process of triangulation, in which the researchers can use two methods to offset the weaknesses of single method and strength the study outcome." By combining multiple observers, theories, methods, and empirical materials, researchers can hope to overcome the weakness or intrinsic biases and the problems that come from single-method, single-observer, and single-theory studies. Often the purpose of triangulation in specific contexts is to obtain confirmation of findings through convergence of different perspectives. The point at which the perspectives converge is seen to represent reality." (Alexander, 2001).

A more recent definition of this technique is provided by Yeasmin & Rahman (2012), "Triangulation is used to combine the advantages of both the qualitative and the quantitative approach. Each method offers specific advantages as well as disadvantages. Recent developments in the philosophy of science have argued that the two traditions should not have a separate-but-equal status, and should instead interact. Triangulation is not aimed merely at validation but at deepening and widening one's understanding, and tends to support interdisciplinary research rather than a strongly bounded discipline of sociology or anthropology."

This study will use triangulation between the patient, the physician and their medical records – some of which are quantitative and some qualitative to ensure the maximum reliable information is obtained in the study.

2.2 Questionnaires design and their use.

Once the diabetes literature on previous research relevant to Kuwait had been collected, read and studied in great detail it was used to devise a strategy for a combination of suitable questionnaires, to address two issues in type 2 diabetes: a) patient diagnosis and their treatment and b) the details recorded in patients' notes. The questionnaire was based on the extensive protocol of the Michigan Diabetes Research and Training Centre (2011) which contains extensively validated questions to assess patients over a wide range of topics.

In their own words they describe their system as:

... “The Michigan Diabetes Research Center (MDRC) is multidisciplinary unit of the University of Michigan funded by the National Institute of Diabetes and Digestive and Kidney disease/National Institute of Health ... The goal of MDRC is to establish, promote, and enhance multidisciplinary and collaborative basic biomedical and clinical research among member investigators studying diabetes, its complications, and related endocrine and metabolic disorder. The missions of the MDRC are to create an environment that supports important and innovative research; raise awareness and interest in fundamental and clinical diabetes research; enhance diabetes research education and training opportunities for patients, students, scientists ,and clinicians ...” (University of Michigan Health System, 2016).

This questionnaire has been used in many studies, in many countries, for many years. The most recent include:

Country (Author)	year
Kuwait (Al –Adsani <i>et al.</i>,)	2009
UK (Collins <i>et al.</i>,)	2010
Malaysia (Al-Qazaz <i>et al.</i>,)	2010
Nigeria (Odili <i>et al.</i>,)	2011
USA (Myra <i>et al.</i>,)	2011

India (Sindhu)	2012
Jordan (Al-Sarihin <i>et al.</i>,)	2012
Arab Emirates (Al-Maskari <i>et al.</i>,)	2013
Saudi Arabia (Al-Odayani <i>et al.</i>,)	2013
Palestine (Sweileh <i>et al.</i>,)	2014
Greece (Digkliou <i>et al.</i>,)	2016
Saudi Arabia (Al-Aboudi <i>et al.</i>,)	2016

These validated questionnaires, were designed to discover patient demographics, their diagnosis, medication(s), diagnostic experiences, their symptoms experienced before diagnosis and throughout the treatment of their diabetic condition.

2.3 Questionnaire usage.

All answers were manually recorded for each patient at the time they were given and the language of the structured format was Kuwaiti Arabic, to ensure clarity about what was being asked so ensuring accurate data was collected as the patient could ask for clarification at any point should that be felt necessary.

Where appropriate specific details of renal dialysis, kidney transplants in the event of renal failure, testing and its frequency for renal problems, advice on diet and exercise was also investigated.

The choice of the Michigan questionnaire enabled the data from Kuwait to be compared to data obtained using the same questions, anywhere else in the world. The results intended to contribute to and inform best practice in relation to type 2 diabetic treatments in Kuwait, which may have positive future impact. They were to be submitted to the Kuwaiti Ministry of Health for their consideration.

2.4 Patients' general medical and medication records.

Aspects of patient diabetic history which they may have forgotten was to be verified from their medical records with help of the nurse who attends to these patients. This should increase the reliability of the data enabling appropriate analysis since if any terms were not understood, data could not be read, or unfamiliar abbreviations used then they could be checked with the nurse, who had been specifically allocated to these patients during their interview. Data about treatment procedures/protocols used

in Kuwaiti clinics and hospitals were to be examined in detail, and the relevant material abstract to complement the patient acquired data. The files were provided by the central registry and examined in a secure location, confidentiality was ensured by the presence of a nurse at all times. No data was ever copied, by any means whatsoever, so complying with the KMOH. All abstracted data was entered on a 'score sheet' displaying only the unique number.

In the thirteen clinics in which this study it was anticipated that the medical records would be the traditional paper record rather than in an electronic format. This would make access to them easier and selective manually copying some of the details on the written records would comply with the KMOH. If electronic records were found the relevant data would be abstracted as for the paper type.

2.5 Structured interviews with physicians.

Nephrologists and ophthalmologists who volunteered were interviewed to obtain their views on current patient treatments of type 2 diabetes exploring the barriers, effectiveness and possible improvements in achieving better control of type 2 diabetes, with emphasis on the renal and ocular aspects. The physicians' answers were designed to discover their views and knowledge of the regulations, barriers and other relevant issues of diabetes treatment in Kuwait. These structured interviews were also to establish the 'medical' techniques used on patients including: eye and renal test, and the routinely applied diagnostic techniques.

This data were to be compared to worldwide standards and to determine any differences, their causes, restrictions, potential solutions, other relevant issues, some of which may provide additional areas for further research. This enabled a corroboration of findings from patients and their physicians, providing a well-rounded perspective while further reducing the potential for bias, so enhancing the reliability of the data.

Only five questions were asked, on the insistence of the Ministry of Health, so as not to overload the consultants. Notes were taken as tape recordings were not allowed

2.6 Ethical considerations and research governance.

Ethical approval was obtained both from the University of Bradford (number E437 and E336), the Human Ethics Committee Kuwait, Ministry Of Health (Appendix 9) and Ascot Rehab Centre. All the participants were coded and their names never

used in the research. The questionnaire results were only used for this research. The ethical issues in this study lies predominantly in the areas of confidentiality.

Limitation

A major research limitation was that none of the medical records could be copied by any means. To avoid the criticism of undue pressures, the researcher ensured freedom to cease participation up to one month following the collection of data. This was achieved by giving each participant a unique number to which all the data collected was and if the subject requested that their data be removed, this would be excluded from the study whilst still preserving anonymity of the individual.

Under the auspices of the Ministry of health of Kuwait, who gave their official permission of this study to be carried out, they suggested that the physician would be the person who would make the request to their patients asking them to take part in this study. Consequently, the researcher had no way to influence their selection and it may be considered that this may have caused some bias because the researcher was not the one who selected patients to ask to take part in the study. Rather it was the physicians who asked patients if they would like to participate in this study and so some patients may have accepted to participate due to power of the ‘white coat effect’ of the physician. But an equal opportunity was given to each patient the physician saw. Of course if during the procedure they felt they had undertaken something they did not want to do they could always stop the process and have their responses removed from the record. Since the investigator did not select which patients to ask, the process may not be considered to provide a random choice of patients but it was within the constraints insisted upon by the medical authorities. The conclusions reached will be considered with this caveat.

2.7 Pilot patient study questionnaire/interviews.

To determine the suitability of the questions a pilot study using a structured interview on 20 type 2 randomly chosen diabetic patients, 10 Kuwaiti and 10 non-Kuwaiti, in six different diabetics clinics was used (Appendix 1) The questions asked about their disease, diagnostic experiences and treatment in the Kuwaiti system and also to determine a deep understanding of patient experiences, needs and feelings. The answers were to determine the feasibility and practicality of the questionnaire design

(Saunders *et al.*, 2009) so as to allow its extension to a greater number of diabetics in Kuwait.

The questionnaire was designed to critically analysed prevalence factors of the disease, provided an insight into patient experiences of their treatment, their knowledge and awareness of and suggestions for quality improvement based on their needs and concerns, regarding their diabetes treatment.

Patient data was to be corroborated using patient note analysis plus interviews with their physicians. The results were used to determine if it was necessary to alter the design of the questionnaire for future studies where over 100 patients would be studied.

2.8 Reliability.

A major factor to ensure the reliability of the study was the questions asked were in Kuwaiti Arabic. For non-Kuwaitis of Indian origin the questions were asked in English. For both groups of patients, they were able to query any question at any stage of the interview so improving the accuracy of the data obtained.

2.9 Selection of patients.

For both the pilot study (n=20) and expanded study (n>100) the following inclusion and exclusion criteria were applied.

2.10 Inclusion criteria.

1. All patients will be required to have been suffering from type 2 diabetes for at least 1 year.
2. Expected to have experience of all the topics covered in the questionnaires.
3. If a patient 'achieves' these conditions, they will be recruited based on these eligibility requirements plus the convenience of location, accessibility, and willingness to participate.
4. Provide their written consent to be involved in such a study.

2.11 Exclusion criteria.

1. a patient who finds the questions 'impracticable' will be excluded from the study.
2. patients suffering type 2 diabetes for less than one year
3. patients who did not receive their diagnoses and treatment in Kuwait facilities.

4. children under 18 years of age
5. people with learning disabilities
6. people with a terminal illness
7. people with mental health problems
8. people with dementia
9. asylum seekers
10. those with any form of dependent relationship with the researcher.

2.12 The selection of patients for the study.

Following a scheduled, routine diabetic appointment, their physician asked them if they would like to take part in a study using a questionnaire/interview about diabetes being conducted by a University Postgraduate student. If they agreed, they were shown into an adjacent room where the investigator (Eman Buhajeih) was sitting behind a table and after introducing themselves, and putting the patient at their ease, the purpose of the study was explained. If they agreed to voluntarily take part, all their answers would be written down, anonymously so no answer could be traced to an individual. The patient was then again asked if they still wanted to take part and if they agreed, their verbal and written agreement to take part in the study as stipulated by the Kuwaiti Ministry of Health was obtained. The questions were then asked.

It was always stressed that they could withdraw from the questions should they decide to do so. All patients were given a unique study number and all answers were written down at the time of the interview on numbered recording sheets. It was stressed to them that when they returned home they could ask for their data to be removed from the study by quoting their unique study number.

2.13 Methods and study design. – Study groups.

Pilot study: The pilot study was carried out on 20 randomly self-selected, type 2-diabetics: 10 Kuwaiti and 10 non-Kuwaiti.

Full Diabetic patients study: The questionnaires were answered by 109, randomly self-selected, type 2 diabetic patients who volunteered to take part in the study. There were 62 Kuwaitis (male 24 & female 38) and 47 non-Kuwaitis (male 23 & female 24) from the diabetic clinics in the three regions of Kuwait namely Hawalli, Al Farwaniyah and Al Asimah.

Diabetic patients with kidney disease: The questionnaires were answered by 79 patients, randomly self-selected, type 2-diabetic patients with kidney disease who volunteered to take part in the study. There were 55 Kuwaitis (male 27, female 28) and 24 non-Kuwaitis (male 14, female 10) from the Mubarak and Hamed Al Essa hospitals: (Appendix 3)

Kuwaiti physicians: Seven consultants - four nephrologists and three ophthalmologists agreed, to participate in this supplementary study, providing evidence regarding the interactions between patients and physicians. (Appendix 4)

2.14 Results of the pilot study in Kuwait.

Pilot, patient study questionnaire/interviews.

The pilot study used questionnaires (Appendix 1) in randomly selected type 2 diabetic patients in a structured interview format (n=20, 10 = Kuwaiti and 10 = non-Kuwaiti) to determine the suitability of the questions, their diagnostic experiences and treatment of diabetes. Some data was corroborated and substantiated using analysis of patient notes and physician interviews. The questionnaire, measured the feasibility and/or practicality of the questionnaire design (Saunders *et al.*, 2009) which analysed across the factors most prevalent in the disease, and also providing an insight into the quality of their care. The data was designed to be corroborated and substantiated by using patient note analysis and also physician interviews. The results could also be used to determine if it was necessary to alter the design of the questionnaire for future studies. The questionnaire was designed to determine a deep understanding of patient experiences, needs and feelings and the feasibility and practicality of the questions to achieve these objectives.

Interviews with patients at diabetic clinics in Kuwait.

The pilot study questionnaire was carried out in July-September, 2014 in the diabetic clinics specified in section 2 of the Methods. The results generated a format to be used for the presentation of the larger study which was to be carried out (n>100).

Sampling procedure.

The questionnaire generated reliable data, despite the number of questions being limited by the Kuwaiti Ministry of Health (KMOH). Since no audio records were

allowed, all data was transcribed from the completed questionnaires immediately after it took place. This study served two purposes, a) to determine if the questions gave answers which could reliably quantify the prevalence and severity and symptoms of diabetes, and b) to determine an understanding of patient perspectives regarding quality, appropriateness and effectiveness of their treatment(s).

Questionnaire results.

The data collected the "prevalence" of a finding in both men / women, Kuwaiti and non- Kuwaiti, the groups to be used in the final study. The mean weight, height, and age enabled calculation of the BMI. The data allowed statistical tests and graphical/tabular representation to be used.

General information from the questionnaires.

The demographic data was: nationality, gender, current age, age of first diagnosis , height and body weight (Table 2.1) Comments for each 'factor' are appended below.

Nationality. The KMOH diabetic clinics treated **only** type 2 diabetic patients, both Kuwaiti nationals and non-Kuwaitis (Table 2.1), 10 were Kuwaiti and 10 were non-Kuwaiti. It should be stressed the data was from KMOH operated clinics and **not** privately funded clinics found in the 'private sector', sponsored for employees of specific companies e.g. Kuwait Oil Corporation [KOC] and other State departments e.g the military hospitals, because access to which could not be granted by KMOH.

Sex/Gender.

The WHO definition of sex and gender was used - "Sex" as the biological and physiological characteristics that define men and women. "Gender" refers to the socially constructed roles, behaviors, activities, and attributes that a given society considers appropriate for men and women, *viz* "male" and "female" are sex categories, while "masculine" and "feminine" are gender categories (WHO, 2016). Since both male and female patients' took part both male and female experiences of diabetes were assessed. The sample was three males and seven female Kuwaitis and six male and four female non-Kuwaitis (Table 2.1).

Age and its distribution.

The patients' age distribution is shown in both Table 2.1 and Figure 2.1. The distribution shows : 20% below the age of 44, for the range 45-54 was 40% and 10 % in the group 55-59 years. Those aged over 60, including people of up to 70 years of age, were 30% reflecting perhaps their success at coping with their diabetes. So,

these clinics treated an age range of type 2 diabetic patients not just those recently diagnosed, indicating that ‘continued care’ existed for all ages groups in the KMOH clinics in Kuwait.

Conclusion. After analysis of the pilot results the design of the questionnaire was ultimately left unchanged, as the data and the comments which were made by the participants revealed that the questionnaires’ structure was unambiguous, feasible, practical and capable of being analysed.

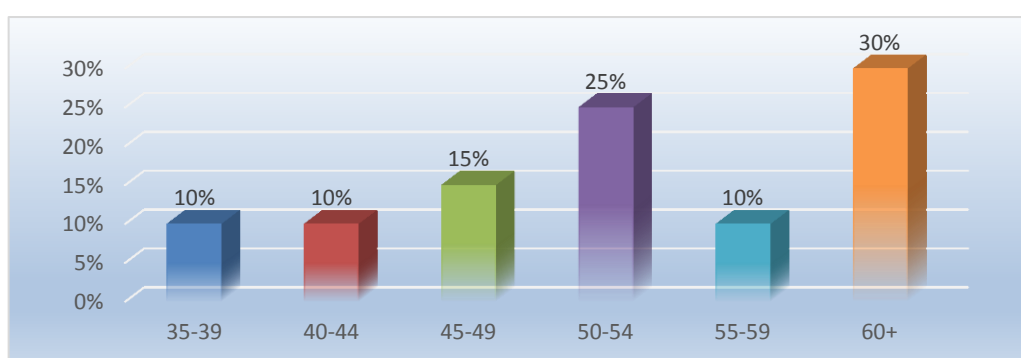


Figure 2.1. Age (grouped by age range in years) distribution of the patients who took part in the pilot study.

Table 2.1. Demographics of the patients, Kuwaiti and non-Kuwaiti taking part in the pilot study.

Demographic	Categories	n	Percent
Nationality	Kuwaiti	10	50%
	Non-Kuwaiti	10	50%
	Total	20	100%
Sex	Male	9	45%
	Female	11	55%
	Total	20	100%
Nationality/Sex	Kuwaiti/Male	3	30%
	Kuwaiti/Female	7	70%
	Total	10	100%
	Non-Kuwaiti/Male	6	60%
	Non-Kuwaiti/Female	4	40%
	Total	10	100%
Current Age	35-39	2	10%
	40-44	2	10%
	45-49	3	15%
	50-54	5	25%
	55-59	2	10%
	60+	6	30%
	Total	20	100%
Age at original diabetes diagnosis	Less than 20 Years	1	5%
	25-29 Years	1	5%

	30-34 Years	2	10%
	35-39 Years	6	30%
	40-44 Years	5	25%
	45-49 Years	3	15%
	50-54 Years	1	5%
	60+ Years	1	5%
	Total	20	100%
Height, weight and BMI	140-149 cm	2	10%
	150-159 cm	6	30%
	160-169 cm	9	45%
	170-179 cm	2	10%
	180+ cm	1	5%
Total		20	100%

2.15 The Ascot study.

Kuwaiti patients in Ascot: The questionnaires were answered by 14 diabetic patients: 9 male & 5 female .All questions asked were in Arabic but an English contextual translation is provided in Appendix 2. The results of this part of the study are shown in Appendix 2A as they are not exactly the same as those asked in Kuwait and the severity of the patients was greater perhaps making direct like-with-like comparisons very difficult, hence, the study may produce great biased.

The Ascot consultants: Five consultant physicians from Ascot Rehab, volunteered to participate in this supplementary study, providing evidence regarding the interactions between patients and physicians (Appendices5&5A).

2.16 Quantitative/Qualitative Methods

Quantitative analysis

Both quantitative and qualitative methods were used in this thesis. The quantitative aspects of the study, the accuracy, reliability and relative freedom from bias are critical criteria for judging the quality of findings (Ulin *et al.*, 2005) enabling valid hypothesis testing (Polgar & Thomas, 2013). Quantification was achieved by numerical procedures – measurement of variables such as HbA1c, estimations i.e. population parameters, with subsequent statistical testing of hypotheses (WHO, 2001). For this thesis the quantitative data included: age, height and weight (enabling the calculation of the BMI) and their age at first diagnosis, enabled the calculation of their disease duration. Other quantitative values were the frequency of hyper/hypoglycemia episodes and the doses of oral hypoglycemic drugs or insulin taken by patients.

Qualitative analysis.

The qualitative aspects focused on patient and physicians perceptions and experiences using a number of open questions. Qualitative studies relate to an understanding of the personal meanings/interpretations concerning specified issues (Polgar & Thomas, 2013). Frequently, it builds theories and moves from observations or open questions to develop general conclusions, which are relative to an inductive process (Ulin *et al.*, 2005). Furthermore, qualitative research does not usually test hypotheses (Polgar & Thomas, 2013) and predominantly uses methods which produce 'text' rather than numbers, i.e. transcripts of interviews, free to comment statements, observation notes, entries in medical/ nursing records (Avis, 2005).

2.17 Power analysis.

The choice of >100 patients to be used in the studies outlined above would increase the power and so reduce the chance of making a type 2 error. In statistical analysis the concept of power is related to making a type 2 error. The usual symbol given for this rate of making this type of error is beta (β) the power of this is then expressed as $1-\beta$. For complex mathematical reasons it is generally accepted that 80% power (ie. Beta =20%) is acceptable in experimental design and is the minimal value for good power (SPSS power analysis http://www.ats.ucla.edu/stat/seminars/Intro_power/). This does however mean that even with this rate, there needs to be a big difference between the measured variable variations between the groups. Smaller differences are less likely to be found because of this type of error. The topic is complicated because some of the information on which the power could be based is simply not known before an experiment is actually carried out. Some say it is an educated guess based on experience, which for someone beginning a PhD is quite difficult to 'guess'. So a combination of an intelligent guess and an intelligent experimental design helped to maximize the power of the experiment.

2.18 Data Analysis.

All the data obtained were prepared in a form suitable for export to the Statistical Package for the Social Sciences (SPSS, version 21) for suitable analyses. Where appropriate, mean/median and standard deviation/interquartile ranges are presented in terms of the prevalence both for men and women, Kuwaiti and non-Kuwaiti.

Quantitative data such as body weight (kg), height (cm) and age (years) are expressed in conventional ways to show the homogeneity/heterogeneity of the groups. Further appropriate analyses using statistics and relationships were performed – a normality test, Student's T test, Mann Whitney U test, correlation coefficients and thematic analysis of comments. P values of less than 0.05 will be considered significant. Where suitable, graphical representations of suitable data will be constructed, ensuring clarity of data presentation.

All the data gathered will be assessed in terms of a) 'effectiveness of present treatment', b) areas for future improvement, c) comparison to best practices, and d) perceived barrier to optimal diabetic care. This will enable the objectives of a) to examine the current patient care of Type 2 diabetes treatment in Kuwait; b) to locate potential barriers to development of treatment with emphasis to renal problems and c) to compare the treatment procedures and outcomes of diabetes in Kuwait, with those recently reported from the UK which used a very similar questionnaire – in terms of the questions asked to that used in this investigation making direct comparisons possible.

Chapter 3

3. Questionnaire Results from 109 diabetic patients in Kuwait.

109 questionnaires were completed by type 2 diabetic patients. There were 62 Kuwaitis and 47 non-Kuwaitis from diabetic clinics in the three regions of Kuwait namely **Hawli** -Salmiya, Sabah Al- Salem, Rumaithiya, **Al Farwaniya** - Jleeb Al-Shuyoukh, Al- Farwaniya , Khaitan, Al-Ardiya , Abdullah Al-Mubarak , **AL-Asimah** - Qurtoba, Al Mansorea, Al-Rawda, Al Adelia and Kaifan . The collected data is presented in terms of the "prevalence" of a finding in both men and women, both Kuwaiti nationals and non-Kuwaitis. The mean weight, height, and age enabled the BMI to be calculated. Statistical tests were used where applicable and suitable graphical representations of some of the data are provided to ensure clarity in data presentation.

3.1 General information from the questionnaires.

Personal demographic characteristics of patients attending their regular appointments in diabetic clinics in Kuwait were obtained. Their nationality, gender, current age, age at which diabetes was first diagnosed and their height, weight and BMI are summarised in Table 3.1.

Nationality of the participants.

The diabetic clinics listed above, all funded by the Kuwaiti Ministry of Health treated both Kuwaiti nationals and non-Kuwaiti patients (Table 3.1). It should be stressed that these clinics treat **only** type 2-diabetics. In this random sample included 62 Kuwaiti patients and 47 non-Kuwaiti patients. It should be stressed that this data was from the Ministry of Health operated clinics and not clinics in the 'private sector' which are privately funded, sponsored for employees of specific companies [e.g. Kuwait Oil Corporation (KOC)] and other departments of the State, such as the military hospitals.

Sex

The numbers of male and female patients in this random sample was 24 males and 38 females Kuwaitis and 23 male and 24 female non-Kuwaitis taking part in the study (Table 3.1).

Table 3.1 Demographics of the patients, Kuwaiti and non-Kuwaiti taking part in the study.

Demographic	Categories	n	Percent
Nationality	Kuwaiti	62	56.9
	Non-Kuwaiti	47	43.1
	Total	109	100%
Sex	Male	47	43.1
	Female	62	56.9
	Total	109	100%
Nationality/Sex	Kuwaiti/Male	24	38.7%
	Kuwaiti/Female	38	61.3%
	Total	62	100%
	Non-Kuwaiti/Male	23	48.9%
	Non-Kuwaiti/Female	24	51.1%
	Total	47	100%
Current Age	30-34	1	0.9%
	35-39	6	5.5%
	40-44	12	11.0%
	45-49	14	12.8%
	50-54	32	29.4%
	55-59	10	9.2%
	60+	34	31.2%
	Total	109	100%
Age at original diabetes diagnosis	Less than 20 Years	1	0.9%
	20-24 Years	1	0.9%
	25-29 Years	5	4.6%
	30-34 Years	14	12.8%
	35-39 Years	20	18.3%
	40-44 Years	28	25.7%
	45-49 Years	23	21.1%
	50-54 Years	9	8.3%
	55-59 Years	3	2.8%
	60+ Years	5	4.6%
	Total	109	100%
Height	140-149 cm	7	6.4%
	150-159 cm	41	37.6%
	160-169 cm	39	35.8%
	170-179 cm	18	16.5%
	180+ cm	4	3.7%
	Total	109	100%

Age distribution in the patient sample

The age distribution of all the patients in the study group (n=109) is shown in Figure 3.1. The mode was found to be 60 years plus.

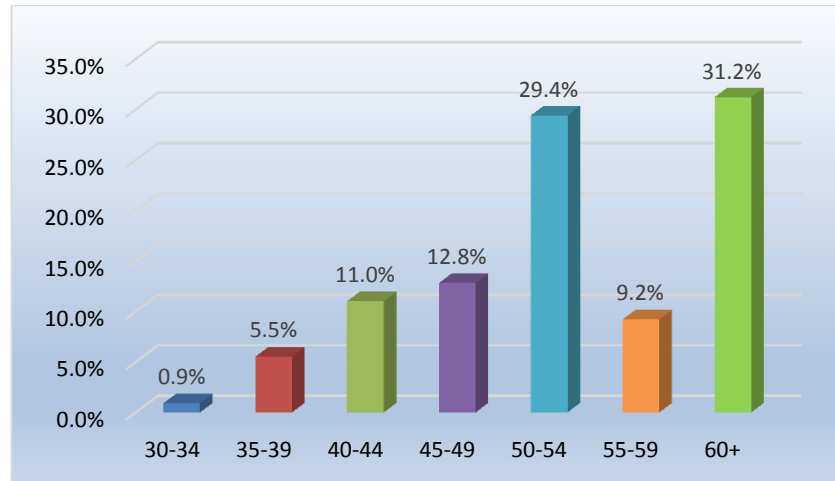


Figure 3.1 .The distribution of the age ranges (years) of the diabetic patients in this study.

The age distribution shows 17.4% were below the age of 45 years. In the next decade, 45-54 years it was 42.2% and 9.2 % in the age group 55-59 years. Those aged over 60, which included people over 70 years of age, was 31.2% of the total number, indicating that many were successfully coping with their diabetic condition which had potentially existed for several decades. Consequently, the clinics were ‘seeing’ type 2 diabetic patients across an age range and not just those recently diagnosed, indicating perhaps that ‘continued care’ existed for all ages of diabetics in the KMOH clinics. The mode for their age at original diagnosis was 40-44 years.

Table 3.2. Summary data of the height, body weight, and BMI of 109 diabetic patients.

Variables		
	Mean	± S. D.
Height (cm)	161.9	9.8
Current Weight (kg)	81.3	15.4
First diagnosis Weight (kg)	84.6	18.4
BMI (current in kg/m ²)	31.1	5.4
BMI (First Diagnosis in kg/m ²)	32.3	6.2

Table 3.2 shows the mean current weight was 81.3 kg, with a S.D. of ± 15.4 kg, compared with a mean weight at first diagnosis of $84.6 \text{ Kg} \pm 18.4 \text{ kg}$. Although the

body weights and BMI at first diagnosis were greater than the current weight/BMI, on analysis there was no significant difference.

Duration of diabetes and its treatment in the respondents.

To enable a simplification of this data the age at which they were **formally diagnosed** with type 2-diabetes was placed into a series of five-year periods, the results are shown in Figure 3.2. The mode was found between 40-44 years, 25.7% the figure of 21.1% was found in the age range 45-49 years indicating that 84.3% had been diagnosed before the age of 49 years. If it is generally accepted that prior to correct diagnosis the disease may have been in process for a number of years, then this suggests that: a) in Kuwait diabetes is more quickly diagnosed than elsewhere, b) the disease actually has an earlier onset than in other countries or, c) that patients are referred to the specialist clinics more quickly.

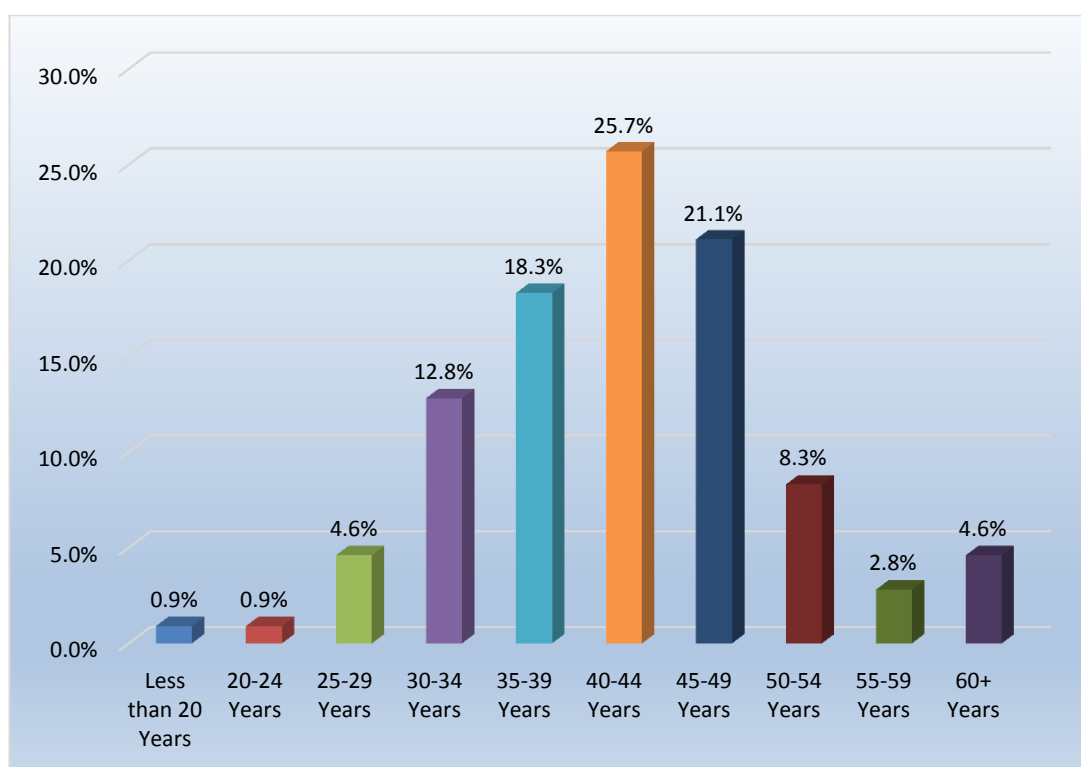


Figure 3.2. The distribution of the age ranges at which type 2 diabetes had first been diagnosed in the study group patients.

Table 3.3 shows that the majority of the patients who took part in the study were ‘established’ diabetics. The Kuwaiti patients had suffered the disease for a mean

duration of 14 years and for non-Kuwaitis 9 years. When the ages were statistically compared using Student's t test, there was no significant difference ($P>0.05$) in terms of age of onset between Kuwaitis and non-Kuwaitis (Table 3.3).

Table 3.3. Mean (\pm S.D.) of the patients current age (years) and their age at the time of original diabetes diagnosis for both Kuwaitis and non-Kuwaitis.

Nationality		Current Age (years)	Age at the time of original diabetes diagnosis (years)
Kuwaiti (n=62)	Mean \pm S.D.	55.23 \pm 8.978	41.52 \pm 9.042
Non-Kuwaiti (n=47)	Mean \pm S.D.	51.13 \pm 8.381	41.94 \pm 8.050

Measurements of and distribution of height, weight, and BMI for the Study Group.

Height - A bar chart of the distribution of body height (cm) of the patients is shown in Figure 3.4 and the mode was 150-159 cm (i.e. 5 feet – 5.25 feet)

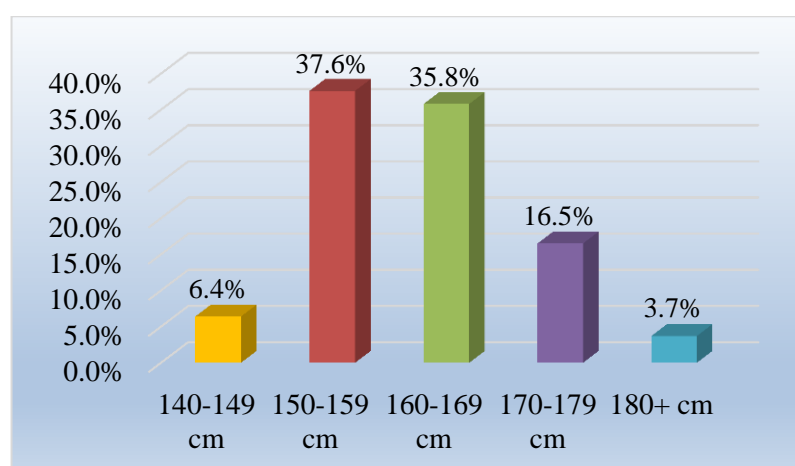


Figure 3.4. Height (cm) distribution of all the patients in this study group.

Body weight. Figure 3.5 shows their mean body weight at first diagnosis body was 84.6 ± 18.4 kg (n=109) and at the time of the study, 81.3 ± 15.4 kg. (Figure 3.5) Using a paired Students t test a statistical difference ($p < 0.05$) was found between the patients' weight at first diagnosis compared to that at the time of the study. The paired t test had by virtue of its pairing effectively removed the influence of variability of the body weight differences between the groups.

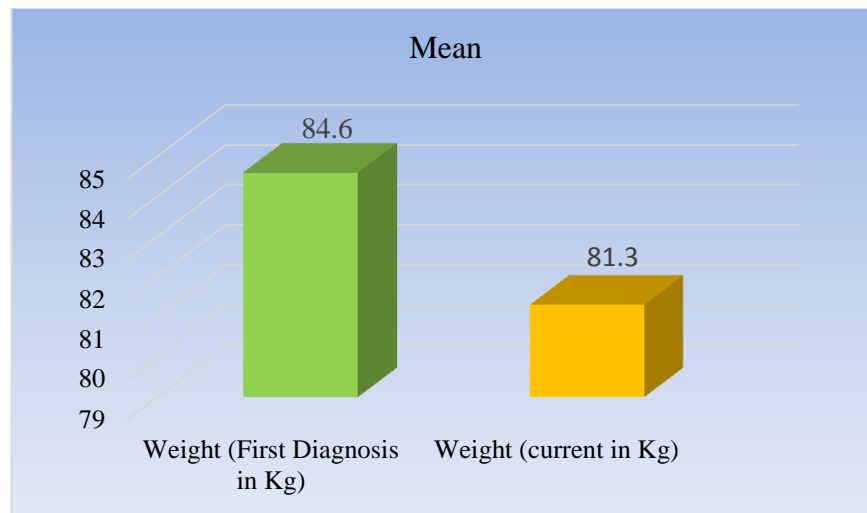


Figure 3.5 .Bar chart of the mean values for the current body weight of patients in the study as compared with their body weight at their first diagnosis.

Analysis of data distribution.

At this stage of the analysis it was appropriate to verify the type of distribution of data the questionnaires had generated and so a test for normality of data was carried out on the quantitative data.

Tests of distribution normality of the data for the body weight of patients in this study.

Table 3.4 shows the results of the Kolmogorov-Smirnov and Shapiro-Wilk test for body weight at the time of the survey and body weight at first diagnosis. The results showed that the data were normally distributed, as their distribution was not significantly different ($p > 0.05$). Therefore, we can conclude that the data is normally distributed. This validates the use of Student's paired t-test for these two variables in the previous and later tests.

Table 3.4. Tests of data normality obtained for the body weight part of the survey.

Variables	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	d.f.	p	Statistic	d.f.	P
Body weight at the time of the survey (Kg)	0.059	109	0.20	0.982	109	0.136
Body weight at first diagnosis (Kg)	0.094	109	0.20	0.900	109	0.000

Table 3.5. Paired Samples Correlations.

Paired Samples Correlations				
		n	R	P
Kuwaiti	Body weight (kg) at the time of the study and body weight (kg) at this time of first diagnosis.	62	0.715	0.000
Non-Kuwaiti	Body weight (kg) at the time of the study and body weight (kg) at this time of first diagnosis.	47	0.842	0.000

Table 3.6. Paired Samples Test

	Paired Differences			t	d.f.	p.
	Mean	S.D.	S.E.			
Kuwaiti						
Body weight (kg) at the time of the study - body weight(kg) at time of first diagnosis	-4.5	14.1	1.79	-2.5	61	0.014
Non-Kuwaiti						
Body weight (kg) at the time of the study - body weight(kg) at time of first diagnosis	-1.7	8.8	1.28	-1.3	46	0.196

Within the Kuwaiti group, there was a significant correlation between the current body weight and body weight at the time of first diagnosis ($r = 0.72$ and p value = 0.000). Consequently, there has been a significant weight loss between the two time periods ($p < 0.014$).

Among the non-Kuwaiti Sample, the body weight at the time of the study and at the time of first diagnosis were not significantly different between these two variables ($p > 0.196$).

Body Mass Index (BMI).

The BMI values \pm S.D. were calculated and compared for the Kuwaiti group, using the paired Student's t test, they were $33.3 \text{ kg/m}^2 \pm 6.7 \text{ kg/m}^2$ at first diagnosis and at the time of the study were $31.6 \text{ kg/m}^2 \pm 5.6$ (Table 4.7) . We have strong evidence against the null hypothesis, therefore, we can say a highly significant difference was found ($p < 0.01$). For the other group (i.e. Non- Kuwaiti) the BMI values were $31.1 \text{ kg/m}^2 \pm 5.2 \text{ kg/m}^2$ at first diagnosis and at the time of the study were $30.3 \text{ kg/m}^2 \pm 5.1$. Although the first value in the table appears to be less than the second is, due to the numerical range no statistical significant difference was found ($p > 0.05$).

Table 3.7. Mean (\pm S.D.) of BMI values before and after diagnosis of type 2 diabetes according to nationality for both Kuwaiti & non-Kuwaitis.

Nationality		BMI - today	BMI - before
Kuwaiti (n=62)	Mean \pm S.D.	31.6 \pm 5.6	33.3 \pm 6.7
Non-Kuwaiti (n=47)	Mean \pm S.D.	30.3 \pm 5.1	31.1 \pm 5.2

The data shown in Table 3.7 is also shown in Figure 3.6, given as an alternative way of data presentation but perhaps the table more clearly expresses the variability of the data whereas the bar chart does not do so.

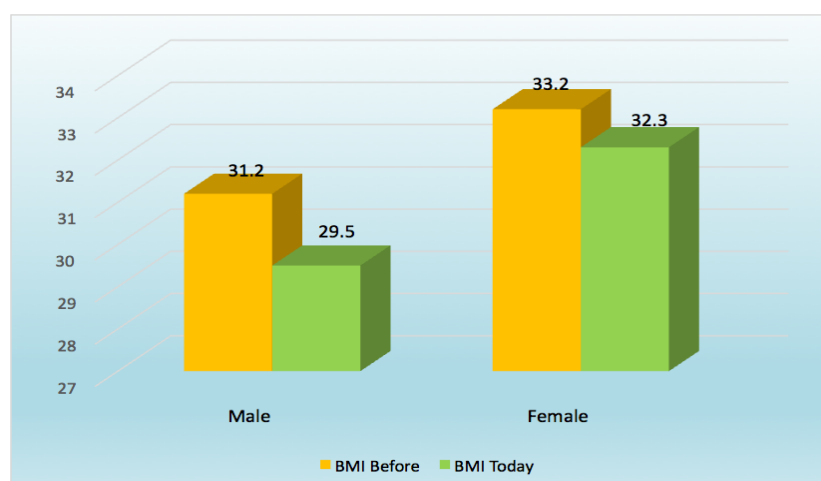


Figure 3.6. Mean Body Mass Index of male and female patients, Kuwaiti and non-Kuwaiti who took part in the study. [Key: Before = on diagnosis, today= the present value].

BMI and sex.

When the BMI of the patients who took part in the study was calculated and expressed for both males and females, both Kuwaiti and non-Kuwaiti, the data is shown in Table 3. 8. Figure 3.6 also shows the data plotted in the form of a bar chart. Tables 3.8 to Figure 3.10 show further analysis of the data.

Table 3.8. Mean \pm S.D. of BMI ‘today’ and at their first diagnosis, according to gender.

Gender		BMI ‘today’	BMI-first diagnosis
Male (n=47)	Mean \pm S.D.	29.5 \pm 5.33	31.2 \pm 6.97
Female (n=62)	Mean \pm S.D.	32.3 \pm 5.19	33.2 \pm 5.47
Total (n=109)	Mean \pm S.D.	31.1 \pm 5.41	32.3 \pm 6.21

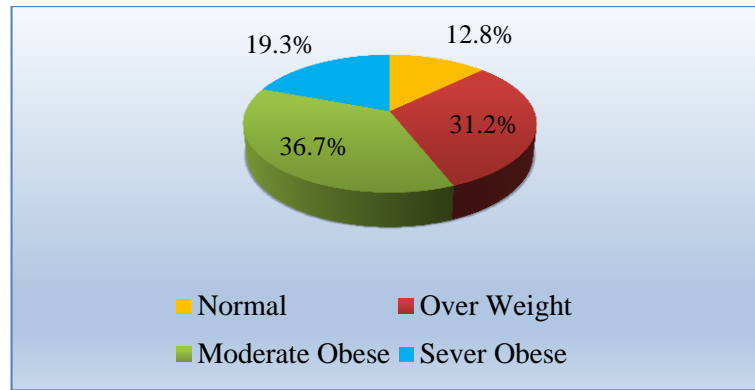


Figure 3.7. The distribution of the current BMI of the patients who took part in the study

Table 3.9. The distribution of the prior BMI of the patients who took part in the study.

Category of BMI	Frequency	Percent
Below Normal (<20)	2	1.8%
Normal (20.0-24.9)	9	8.3%
Over Weight (25.0-29.9)	25	22.9%
Moderately Obese (30.0-34.9)	43	39.4%
Severe Obese (above 35.0)	30	27.5%
Total	109	100%

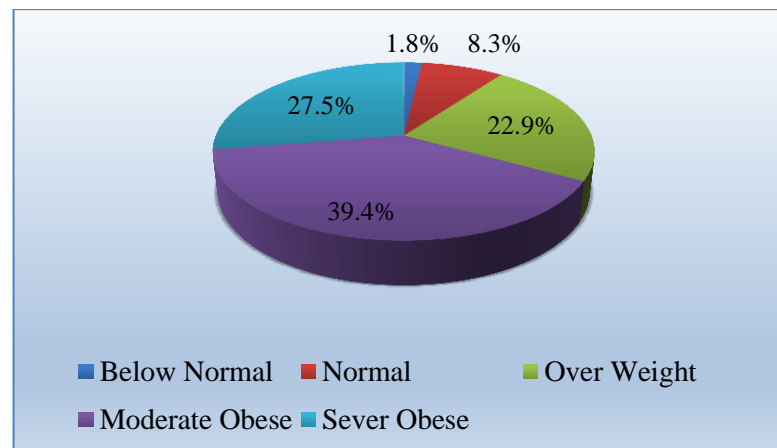


Figure 3.8. The distribution of the prior BMI of the patients who took part in the study.

Table 3.10. The cross tabulation between current BMI of the patients and nationality.

Nationality		Current BMI				Total
		Normal	Over weight	Moderately obese	Severely obese	
Kuwaiti	n	8 (12.9%)	18 (29%)	22 (35.5%)	14 (22.6%)	62
Non-Kuwaiti	n	6 (12.8%)	16 (34%)	18 (38.3%)	7 (14.9%)	47
Total	n/%	14 (12.8%)	34 (31.2%)	40 (36.7%)	21(19.3%)	109 (100 %)

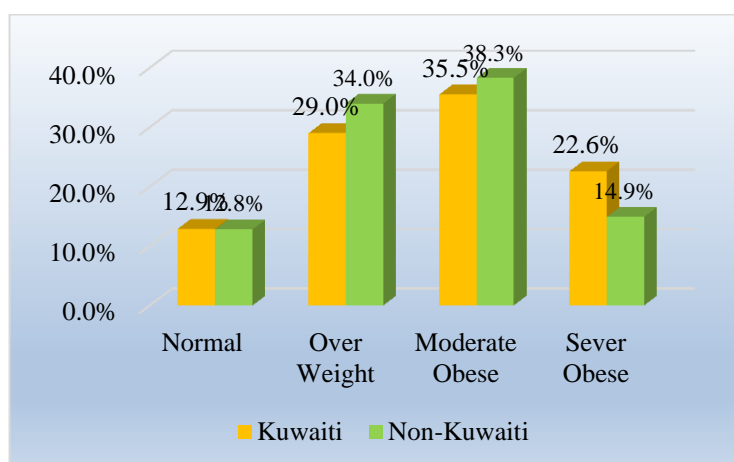


Figure 3.9. The cross tabulation between current BMI of the patients and nationality.

Table 3.11. The cross tabulation between prior BMI of the patients and nationality.

Nationality		Current BMI					Total
		Below Normal	Normal	Over Weight	Moderately Obese	Severe Obese	
Kuwaiti	n	1 (1.6%)	6 (9.7%)	11 (17.7%)	24 (38.7%)	20 (32.3%)	62
Non-Kuwaiti	n	1 (2.1%)	3 (6.4%)	14 (29.8%)	19 (40.4%)	10 (21.3%)	47
Total	n/%	2 (1.8%)	9 (8.3%)	25 (22.9%)	43 (39.4%)	30 (27.5%)	109 (100 %)

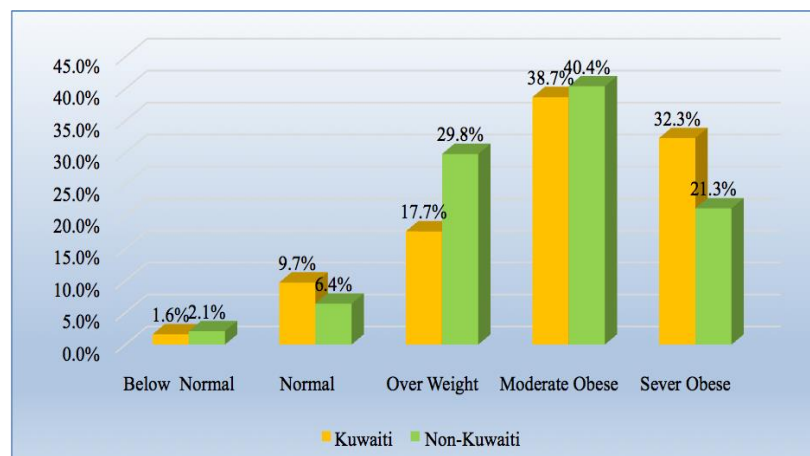


Figure 3.10. The cross tabulation between prior BMI of the patients and nationality.

3.2 Treatment & Medication Use.

This question requested respondents to provide a statement as to what course of action was recommended for the treatment of their disease at the time of their original diagnosis. From the data shown in Table 3.12, the majority, n=83, of both Kuwaiti and non-Kuwaiti patients received tablet medication for their type 2 diabetes. The next most common course of action was Insulin (n=10), and this represented 9.2% of the total number of patients. A final group, had been prescribed oral medication in combination with exercise (n=5).

Table 3.12. Cross tabulation between nationality and recommended course of action

Nationality * what course of action was recommended when you were first diagnosed?

Nationality	What course of action was recommended when you were first diagnosed?							Total
	Tablets medication	Dietary change	Insulin	Tablet Medication, Dietary Change & Exercise	Tablet Medication & Dietary Change	Tablet & Exercise	Dietary & Exercise	
Kuwaiti	45 (72.6%)	5 (8.1%)	4 (6.5%)	1 (1.6%)	4 (6.5%)	2 (3.2%)	1 (1.6%)	62
Non-Kuwaiti	38 (80.9%)	0	6 (12.8%)	0	0	3 (6.4%)	0	47
Total	83 (76.1%)	5 (4.6%)	10 (9.2%)	1 (0.9%)	4 (3.7%)	5 (4.6%)	1 (1.6%)	109(100%)

Treatments and medication with regard to the sex of the patients.

From Figure 3.11, the majority of patients received for their first line treatment ‘tablet medication’. In contrast, 14.9% of the male respondents received insulin as their first line treatment and 8.5% tablets and exercise, respectively. Whereas, for females, 4.8% received insulin and 1.6% tablets and exercise. From Figure 3.12 and Table 3.13, 19.7% of the respondents (i.e. 14.9% male and 4.8% female), their first recommendation was to use insulin.

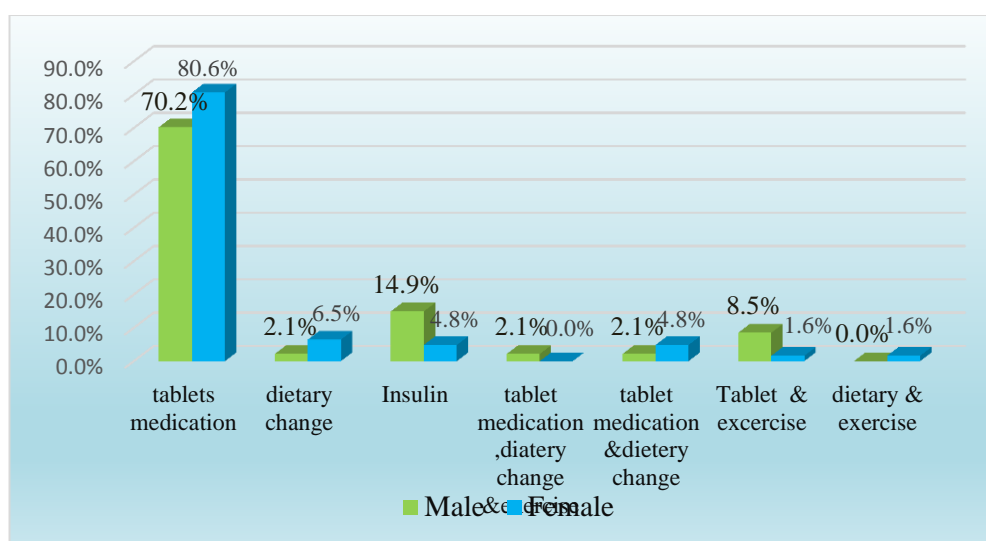


Figure 3.12. Distribution between the sexes of recommended courses of action to help control their diabetes.

Table 3.13. Summary table for both males and females of the recommended courses of action for the control of their diabetes.

Nationality/Sex			What course of action was recommended when you were first diagnosed?						Total
			Tablets medication	Dietary change	Insulin	Tablet medication, dietary change & exercise	Tablet & exercise	Dietary & exercise	
Kuwaiti	Male	n	16 (66.7%)	1 (4.2%)	3 (13%)	2 (8.3%)	2 (8.3%)	0	24
	Female	n	29 (76.3%)	4 (10.5%)	1 (2.6%)	3 (7.9%)	0	1 (2.6%)	38
	Total	n	45 (72.6%)	5 (8.1%)	4 (6.5%)	5 (8.1%)	2 (3.2%)	1 (1.6%)	62 (100%)
Non-Kuwaiti	Male	n	17 (73.9%)	0	4 (17%)	0	2 (8.7%)	0	23

Kuwaiti	Female	n	21(87.5%)	0	2 (8.3%)	0	1(4.2%)	0	24
	Total	n/%	38 (81%)	0	6 (13%)	0	3 (6%)	0	47 (100%)

Dietary advice given to type 2 diabetes patients.

This question asked if respondents were ever able to control their diabetes through diet alone. From the data shown in Table 3.14, the percentage of Kuwaitis who controlled diabetes with diet alone (8%) is greater than the percentage of non-Kuwaitis none of whom had been able to control their diabetes through diet alone. From Table 3.14., we can see that females had a higher ability to control diabetes than males (10.5% and 4.2%) respectively. Only four Kuwaiti females reported being able to do this, and the disease was controlled **only** for six months. In one of the female patients she did not remember what actual dietary advice had been recommended for her to do.

Table 3.14. Cross tabulation between Nationality and sex and ability to control diabetes with diet alone in both Kuwaiti and non-Kuwaiti.

Nationality/ Sex			Were you ever able to control your diabetes through diet alone?		Total
			Yes	No	
Kuwaiti	Male	n	1 (4.2%)	23 (95.8%)	24
	Female	n	4 (10.5%)	34 (89.5%)	38
	Total	n/%	5 (8.1%)	57 (91.9%)	62 (100%)
Non-Kuwaiti	Male	n	0	23 (100%)	23
	Female	n	0	24 (100%)	24
	Total	n/%	0	47 (100%)	47 (100%)

Controlling diabetes with tablets medication.

This question enquired whether or not the patients were ever able to control their diabetes with "pill medication" for any length of time (Table 3.15). Kuwaiti patients were found to have a higher ability to control diabetes with tablets medication than Non-Kuwaiti patients do (96.8% and 95.7%) respectively.

Table 3.15. Cross tabulation between Nationality and their ability to control diabetes with ‘tablets medication’ i.e. oral hypoglycemic.

Nationality/ Sex		Were you ever able to control your diabetes with tablets medication?		Total
		Yes	No	
Kuwaiti	n	60 (96.8%)	2 (3.2%)	62
Non-Kuwaiti	n	45 (95.7%)	2 (4.3%)	47
Total	n/%	105 (96.3%)	4 (3.7%)	109 (100%)

Table 3.16. Cross tabulation between nationality and their current medications.

Currently Taking Medications		Nationality		n
		Kuwaiti	Non-Kuwaiti	
Glyburide	n	4 (57.1%)	3 (42.9%)	7
Glimepiride	n	3 (60%)	2 (40%)	5
Metformin	n	20 (57.1%)	15 (42.9%)	35
Tablet medication replaced by Insulin	n	6 (46.2%)	7 (53.8%)	13
Gliclazide	n	8 (88.9%)	1 (11.1%)	9
Glucovance	n	1 (100%)	0	1
I don't remember the name of the tablet	n	2 (100%)	0	2
Glyburide & Metformin	n	0	4 (100%)	4
Glimepiride & Metformin	n	5 (62.5%)	3 (37.5%)	8
Metformin & Gliclazide	n	8 (47.1%)	9 (52.9%)	17
Total	n/%	57 (56.4%)	44 (43.6%)	101 (100%)

The medications taken by Kuwaiti and non-Kuwait diabetics were variable (Table 3.16). The commonest monotherapy drug for both groups was metformin, Kuwaiti (n=20) and non-Kuwaiti (n=15). Glyburide was used by Kuwaitis and non-Kuwaitis alone (n=7), but only non- Kuwaitis used glyburide in combination with metformin (n=4).

Table 3.17. Cross tabulation between nationality, sex and current taking medications.

Sex	Currently Taking Medications		Nationality		Total
			Kuwaiti	Non-Kuwaiti	
Male	Glyburide	n	3	2	5
	Glimepiride	n	2	2	4
	Metformin	n	9	6	15
	Tablet Medication replaced by Insulin	n	0	3	3
	Gliclazide	n	2	1	3

	I don't remember the name of the tablet	n	1	0	1
	Glyburide & Metformin	n	0	1	1
	Glimepiride & Metformin	n	3	2	5
	Metformin & Gliclazide	n	1	4	5
	Total	n/ %	21 (50%)	21 (50%)	42 (100%)
Female	glyburide	n	1	1	2
	glimepiride	n	1	0	1
	metformin	n	11	9	20
	Tablet medication replaced by Insulin	n	6	4	10
	Gliclazide	n	6	0	6
	Glucovance	n	1	0	1
	I don't remember the name of the Tablet	n	1	0	1
	Glyburide & Metformin	n	0	3	3
	Glimepiride & Metformin	n	2	1	3
	Metformin & Gliclazide	n	7	5	12
	Total	n/ %	36 (61%)	23 (39%)	59 (100%)

We can see from Table 3.17, the percentage of non-Kuwaiti females who were currently taking glyburide and metformin was greater than that for non-Kuwaiti males (3 and 1 respectively). There was no association between sex and the types of medications taken currently according to nationality, Chi-Square Test p-values were 0.421 and 0.280 for male and female respectively.

Insulin usage in type 2 diabetes

Table 3.18. Cross tabulation between nationality, sex, and controlling diabetes-using insulin.

Nationality/Sex			Have you <u>ever</u> used insulin to control your diabetes?		Total
			Yes	No	
Kuwaiti	Male	n	9 (37.5%)	15 (62.5%)	24
	Female	n	20 (52.6%)	18 (47.4%)	38
	Total	n/%	29 (46.8%)	33 (53.2%)	62 (100%)
Non-Kuwaiti	Male	n	13 (56.5%)	10 (43.5%)	23
	Female	n	13 (54.2%)	11 (45.8%)	24
	Total	n/%	26 (55.3%)	21 (44.7%)	47 (100%)

From Table 3.18, the percentage of Kuwaiti females who had occasion to control their diabetes using insulin is very similar to the percentage of non-Kuwaiti females using insulin (52.6% versus 54.2%). For males, 37.5% of the Kuwaiti males and

56.5% of non-Kuwaiti males had had occasion to control their diabetes using insulin. Statistical comparisons found no association between nationality and controlling diabetes using insulin according to sex, Chi-Square Test, p-values of 0.245 and 0.871 for Kuwaiti and Non-Kuwaiti respectively.

Using insulin to control your diabetes:

Table 3.19. Cross tabulation between nationality and controlling diabetes-using insulin.

Nationality		Have you <u>ever</u> used insulin to control your diabetes?		Total
		Yes	No	
Kuwaiti	n	29 (46.8%)	33 (53.2%)	62
Non-Kuwaiti	n	26 (55.3%)	21 (44.7%)	47
Total	n/%	55 (50.5%)	54 (49.5%)	109 (100%)

From Table 3.19 the percentage of Kuwaitis who used insulin to control diabetes is less than that for Non-Kuwaiti (46.8% versus 55.3%). Using the Chi-Square Test there was difference ($p = 0.377$) between these variables.

Table 3.20. Cross tabulation between sex and controlling diabetes using insulin

Sex		Have you ever used insulin to control your diabetes?		Total
		Yes	No	
Male	n	22 (46.8%)	25 (53.2%)	47
Female	n	33 (53.2%)	29 (46.8%)	62
Total	n/%	55 (50.5%)	54 (49.5%)	109 (100%)

From Table 3.20 the percentage of males who controlled their diabetes-using insulin was less than that for females (46.8% versus 53.2%). But these were not significantly different (p value was 0.507).

Table 3.21. Cross tabulation between nationality and sex and length of time (months/years) using insulin.

Nationality/ length of time using Insulin				Sex		Total
				Male	Female	
Kuwaiti	If yes, please write the length of time you took Insulin	Less than one month	n	1	3	4
		1-2 months	n	0	1	1
		3-4 months	n	1	1	2
		5-6 months	n	0	2	2
		7-12 months	n	1	2	3
		1-2 years	n	2	0	2

		above 2 years	n	4	11	15
	Total		n	9	20	29
			%	31%	68%	100%
Non-Kuwaiti	If yes, please write the length of time you took Insulin	Less than one month	n	2	2	4
		1-2 months	n	1	3	4
		3-4 months	n	1	1	23
		5-6 months	n	2	0	2
		7-12 months	n	1	1	2
		1-2 years	n	1	0	1
		above 2 years	n	5	6	11
	Total		n	13	13	26
			%	50%	50%	100%

Generally, both sexes among Kuwaiti and non-Kuwaitis tended to use insulin for different length of times. This will be considered in more detail in the discussion.

The third part of the question was to establish if they were still using insulin and the result are as shown below in Table 3.22.

Table 3.22. Cross tabulation between nationality and sex and still taking insulin for diabetes

Nationality/Sex			Are you still taking insulin for your diabetes?		Total
			Yes	No	
Kuwaiti	Male	n	8 (88.9%)	1 (11.1%)	9
	Female	n	18 (90%)	2 (10%)	20
	Total	n/%	26 (89.7%)	3 (10.3%)	29 (100%)
Non-Kuwaiti	Male	n	10 (76.9%)	3 (23.1%)	13
	Female	n	9 (69.2%)	4 (30.8%)	13
	Total	n/%	19 (73.1)	7 (26.9%)	26 (100%)

Table 3.22 shows the percentages of Kuwaitis still taking insulin for diabetes were virtually the same for males and females (88.9% for males and 90% for females). For non-Kuwaiti members the percentage of males still taking insulin for diabetes was greater than that for females (76.9% and 69.2% respectively).

Three patient experiences are worth specific comments.

Patient one, mentioned that the diabetic physician prescribed insulin for her for a week and she suffered from severe hypoglycemia and after that she spoke with her physician and he changed it again to tablets.

Patient two, said that following sleeve gastrectomy surgery he stopped taking insulin and now he only takes tablets.

Patient three, his blood glucose increase to **144 mg/dl (8 mmol)** and his diabetic physician prescribed for him insulin. He took it for 3 days and he felt tiredness and he went to another physician and he told him that his blood glucose is not high. After that, he stopped insulin and he took tablets.

3.3 Resource use (diagnoses and management)

Table 3.23. Cross tabulation between nationality and sex and examining blood sugar using a primary method

Nationality/ Sex			What is your primary method for personally examining your blood-sugar level?					Total
			Blood or urine test (at the doctor's office only*)	Blood glucose test strips read by eye at home	Urine glucose test strips at home	Blood glucose read by strips and meter**	Non	
Kuwaiti	Male	n	11(45.8%)		0	13 (54.2%)	0	24
	Female	n	19 (50%)		3 (7.9%)	14 (36.8%)	2 (5.3%)	38
	Total	n	30		3	27	2	62
		%	48.4%		4.8%	43.5%	3.2%	100%
Non-Kuwaiti	Male	n	12 (52.2%)	1(4.3%)	0	9 (39.1%)	1 (4.3%)	23
	Female	n	10 (41.7%)	0	0	14 (58.3%)	0	24
	Total	n	22	1	0	23	1	47
		%	46.8%	2.1%		48.9%	2.1%	100%

Key * = these test are carried out at approximately two, three or four months apart.

** = these tests were found to be carried out at variable timings such as: two to six times per week and some were carried out on a daily basis.

Table 3.23 shows that 45.8% of Kuwaiti males used blood or urine tests at the doctor's office only. In contrast, 52.2% of non-Kuwaiti males were using that method. In addition, 54.2% of Kuwaiti males used blood glucose strips and a meter, whereas 39.1% of non-Kuwaiti males used that method. There was no significant difference between nationalities and examining blood sugar using a primary method (p-value 0.421). On analysis, 55.3% of Kuwaiti females had never examined blood sugar level in the past month, while 45.8% of Kuwait males had never examined their blood sugar level in the past month. Moreover, 54.2% of non-Kuwaiti females

had never examined blood sugar level in the past month and 56.5% of the males had done the same (see Table 3.24).

Table 3.24. Cross tabulation between nationality and sex and how often examined blood sugar level in the past month.

Nationality/Sex			How often have you examined your blood sugar level in the past month?						Total
			Never	Once a week or less	Roughly 2-6 times per week	Daily	Twice a day or more	Three times or more	
Kuwaiti	Male	n	11(45.8%)	6 (25%)	4 (16.7%)	2 (8.3%)	0	1(4.2%)	24
	Female	n	21(55.3%)	7 (18.4%)	6 (15.8%)	1(2.6%)	3 (7.9%)	0	38
	Total	n	32	13	10	3	3	1	62
		%	51.6%	21.0%	16.1%	4.8%	4.8%	1.6%	100%
Non-Kuwaiti	Male	n	13 (56.5%)	5 (21.7%)	4 (17.4%)	1(4.3%)	0	0	23
	Female	n	13 (54.2%)	6(25%)	4 (16.7%)	1(4.2%)	0	0	24
	Total	n	26	11	8	2	0	0	47
		%	55.3%	23.4%	17.0%	4.3%	0%	0%	100%

Analysis of this data showed no association between nationalities and number of times of blood examination for blood sugar level in the past month, attributed to sex, (p 0.814 and 0.678).

The **eighth question** asked patients if they have ever discussed the possibility of amputation as a result of their diabetes. Only one (14.3%) Kuwaiti females had had problems serious enough for amputation to be necessary.

Routine visits to the doctor

45.8% of Kuwaiti males visited their doctors for diabetes, five or more times a year, and 45.8% for 3 to 4 times a year, whereas 31.6% of Kuwaiti females visited their doctors for diabetes five or more times a year, and 63.2% for 3 to 4 times a year (Table 3.25). Among non-Kuwaiti males, 56.5% of them visited their doctors five or more times a year, and 43.5% for 3 to 4 times a year. In contrast, 75% of non-Kuwaiti females visited their doctors for diabetes for 3 to 4 times a year. All sample members reported that they only visited a diabetes specialist.

Table 3.25. Cross tabulation between nationality and sex and visits to their doctor, approximately, do you routinely visit your doctor for diabetes

Nationality/Sex			How often, approximately, do you routinely visit your doctor for diabetes?			Total
			5 or more times a year	3 to 4 times a year	1 or 2 times a year	
Kuwaiti	Male	n	11 (45.8%)	11 (45.8%)	2 (8.3%)	24
	Female	n	12 (31.6%)	24 (63.2%)	2 (5.3%)	38
	Total	n/%	23 (37.1%)	35 (56.5%)	4 (6.5%)	62 (100%)
Non-Kuwaiti	Male	n	13 (56.5%)	10 (43.5%)	0	23
	Female	n	6 (25%)	18 (75%)	0	24
	Total	n/%	19 (40.4%)	28 (59.6%)	0	47 (100%)

On analysis there was an association between nationalities and making routine visits to the doctor, (p-value is 0.028), in favor of non-Kuwaiti, subject to sex.

Foot examination.

The feet of only 13.2% of Kuwaiti females and 8.3% of males were examined by a diabetes specialist. Among non-Kuwaitis 13.0% of males and 0% of females had had their feet examined (Table 3.26).

Table 3.26. Cross tabulation between nationality and sex and examined feet by the doctor.

Nationality/Sex			During the past year, has your doctor examined your feet?		Total
			Yes	No	
Kuwaiti	Male	n	2 (8.3%)	22 (91.7%)	24
	Female	n	5 (13.2%)	33 (86.8%)	38
	Total	n	7	55	62
		%	11.3%	88.7%	100%
Non-Kuwaiti	Male	n	3 (13%)	20 (87%)	23
	Female	n	0	24 (100%)	24
	Total	n	3	44	47
		%	6.4%	93.6%	100%

Diet/weight management

Statistical analysis of this data proved impossible because the majority of the patients used the “do not know” category. They did not know the number of calories that they should consume on a daily basis to maintain a healthy and optimal body weight. Also

only 4.2% and 2.6% of Kuwaiti males and females had been placed on a weight management program from a hospital dietitian. For non-Kuwaiti males and females 0% were on weight management program from a hospital dietitian (see Table 3.27).

Table 3.27. Cross tabulation between nationality and sex and weight management program from a hospital dietitian

Nationality/Sex			Please state whether you are on a weight management program from a hospital dietitian		Total
			Yes	No	
Kuwaiti	Male	n	1 (4.2%)	23 (95.8%)	24
	Female	n	1 (2.6%)	37 (97.4%)	38
	Total	n/%	2 (3.2%)	60 (96.8%)	62 (100%)
Non-Kuwaiti	Male	n	0	23 (100%)	23
	Female	n	0	24 (100%)	24
	Total	n/%	0	47 (100%)	47 (100%)

Exercise.

37.5% and 28.9% of Kuwaiti males and females were walking for 10-30 minutes every day, while 43.5% and 25% of non-Kuwaiti males and females were walking for 10-30 minutes every day (Table 3.28). In addition, 37.5% and 39.5% of Kuwaiti males and females were walking twice or 3 times a week for 10-30 minutes, while 39.1% and 45.8% of non-Kuwaiti males and females were walking twice or 3 times a week for 10-30 minutes (Table 3.28).

Table 3.28. Cross tabulation between nationality and sex and types of exercise.

Nationality			Please fill in the appropriate box if you carry out any of the following type of exercise						Total
			Walking for 10-30 minutes every day	Walking twice or three times a week for 10-30 minutes	Attending a gym for a session of up to 30 minutes . a week	Swimming twice or more a week for 10-30 minutes.	Other/ Eikidude	No exercise	
Kuwaiti	Male	n	9(37.5%)	9(37.5%)	0	1(4.2%)	1(4.2%)	4(16.7%)	24
	Female	n	11(28.9%)	15(39.5%)	0	2(5.3%)	0	10(26.3%)	38
	Total	n	20	24	0	3	1	14	62

		%	32.3%	38.7%	0%	4.8%	1.6%	22.6%	100%
Non-Kuwaiti	Male	n	10(43.5%)	9(39.1%)	1(4.3%)		1((4.3%)	2 (8.7%)	23
	Female	n	6 (25%)	11(45.8%)	1(4.2%)		0	6 (25%)	24
	Total	n	16	20	2		1	8	47
		%	34.0%	42.6%	4.3%		2.1%	17.0%	100%

The Chi-Square Test found no association between nationalities and types of exercise followed by the study members attributed to sex, since the p-values were 0.631 and 0.382.

3.4 Diabetes complications.

Only 8.3% of Kuwaiti males had a high awareness of diabetes complications, and 50.0% of Kuwaiti females a medium awareness, while only 4.3% of non-Kuwaiti males had a high awareness, and 41.7% of non-Kuwaiti females had a medium awareness (Table 3.29). The **awareness value** was calculated as follows: If a patient was aware of 5 or more of the complications this indicates a "high awareness", 3 to 4 complications meant the patient had a "medium awareness" and 2 or less they had a "low awareness".

Table 3.29. Cross tabulation between Nationality and Sex and Awareness of Diabetes Complications

Nationality/Sex			Awareness of Diabetes Complications			Total
			High Awareness	Medium Awareness	Low Awareness	
Kuwaiti	Male	n	2 (8.3%)	10 (41.7%)	12 (50%)	24
	Female	n	0	19 (50%)	19 (50%)	38
	Total	n/%	2 (3.2%)	29 (46.8%)	31 (50%)	62 100%
Non-Kuwaiti	Male	n	1 (4.3%)	10 (43.5%)	12 (52.2%)	23
	Female	n	0	10 (41.7%)	14 (58.3%)	24
	Total	n/%	1 (2.1%)	20 (42.6%)	26 (55.3%)	47 (100%)

On analysis there was no association between nationality and awareness of diabetes complications attributed to sex among the two groups (Kuwaiti and non-Kuwaiti) since p-values were 0.184 and 0.567 respectively (Chi-Square Test).

After an analysis of the overall awareness answers to specific question was then carried out.

Kidney problems

Table 3.30 shows that 83.3% of Kuwaiti males were aware of kidney complication and for Kuwaiti females it was 73.7%. In contrast, the non-Kuwaiti males, their awareness of kidney complication was 73.9% and for the non-Kuwaiti females' the percentage was 66.7%.

Table 3.30. Cross tabulation between nationality and sex and kidney complication(s).

Nationality/Sex			Kidney Complications		Total
			No	Yes	
Kuwaiti	Male	n	4 (16.7%)	20 (83.3%)	24
	Female	n	10 (26.3%)	28 (73.7%)	38
	Total	n/%	14 (22.6%)	48 (77.4%)	62 (100%)
Non-Kuwaiti	Male	n	6 (26.1%)	17 (73.9%)	23
	Female	n	8 (33.3%)	16 (66.7%)	24
	Total	n/%	14 (29.8%)	33 (70.2%)	47 (100%)

Feet problems

Table 3.31 shows that the percentage of Kuwaiti males who knew about feet complication was 58.3% while for Kuwaiti females it was 55.3%. On other hand, the percentage of both non-Kuwaiti males and females who know about feet complication were 52.2% and 54.2% respectively.

Table 3.31. Cross tabulation between Nationality and Sex and Feet Complication.

Nationality/Sex			Foot Complication		Total
			No	Yes	
Kuwaiti	Male	n	10 (41.7%)	14 (58.3%)	24
	Female	n	17 (44.7%)	21 (55.3%)	38
	Total	n/%	27 (43.5%)	35 (56.5%)	62 (100%)
Non-Kuwaiti	Male	n	11 (47.8%)	12 (52.2%)	23
	Female	n	11 (45.8%)	13 (54.2%)	24
	Total	n/%	22 (46.8%)	25 (53.2%)	47 (100%)

Nerve problems.

Table 3.32 shows that 29.2% of Kuwaiti males were aware of nerve complication(s) while the Kuwaiti for females it was 10.5%. For the non-Kuwaiti males, 13% were aware of nerve complication and for the non-Kuwaiti females the percentage was 16.7%.

Table 3.32. Cross tabulation between nationality and sex and nerve complication(s).

Nationality/ Sex			Nerve Complication		Total
			No	Yes	
Kuwaiti	Male	n	17 (70.8%)	7(29.2%)	24
	Female	n	34 (89.5%)	4(10.5%)	38
	Total	n/%	51 (82.3%)	11 (17.7%)	62 (100%)
Non-Kuwaiti	Male	n	20 (87%)	3(13%)	23
	Female	n	20 (83.3%)	4(16.7%)	24
	Total	n/%	40 (85.1%)	7 (14.9%)	47 (100%)

Eye problems.

From the percentage distribution in the above table (Table 3.33) **all** Kuwaitis had knowledge about eye complications, while above 95% of the non-Kuwaiti group had knowledge about eye complication

Table 3.33. Cross tabulation between nationality and sex and eye complications.

Nationality/Sex			Eye Complication		Total
			No	Yes	
Kuwaiti	Male	n	0	24 (100%)	24
	Female	n	0	38 (100%)	38
	Total	n/%	0	62 (100%)	62 (100%)
Non-Kuwaiti	Male	n	1 (4.3%)	22 (95.7%)	23
	Female	n	1 (4.2%)	23 (95.8%)	24
	Total	n/%	2 (4.3%)	45 (95.7%)	47 (100%)

Digestive problems.

Table 3.34 shows that the percentage of Kuwaiti males who knew of digestive complication was 8.3% while for Kuwaiti females it was 0%. On other hand, the non-Kuwaiti males, who knew about digestive complication was 8.7% while for the non-Kuwaiti females the percentage was 0%.

Table 3.34. Cross tabulation between nationality and sex and digestive complication(s).

Nationality/Sex			Digestive Complication		Total
			No	Yes	
Kuwaiti	Male	n	22 (91.7%)	2 (8.3%)	24
	Female	n	38 (100%)	0	38
	Total	n/%	60 (96.8%)	2 (3.2%)	62 (100%)
Non-Kuwaiti	Male	n	21(91.3%)	2 (8.7%)	23
	Female	n	24 (100%)	0	24
	Total	n/%	45 (95.7%)	2 (4.3%)	47 (100%)

Other Complications

Table 3.35 shows that the percentage of Kuwaiti males and females who knew about other complications was 0% and 2.6%, while for the non-Kuwaiti males and females the percentages were 8.7% and 0%.

Table 3.35. Cross tabulation between nationality and sex and other complication(s).

Nationality/Sex			other Complications		Total
			No	Yes	
Kuwaiti	Male	n	24 (100%)	0	24
	Female	n	37 (97.4%)	1 (2.6%)	38
	Total	n/%	61 (98.4%)	1 (1.6%)	62 (100%)
Non-Kuwaiti	Male	n	21(91.3%)	2 (8.7%)	23
	Female	n	24 (100%)	0	24
	Total	n/%	45 (95.7%)	2 (4.3%)	47 (100%)

Patient experience of symptoms& complication of the type 2-diabetes.

Hypoglycemia

Table 3.36 shows that non-Kuwaiti females and males who had experienced low blood sugar the figures were 57.9% and 54.2% respectively. This contrasts with non-Kuwaiti female and males of 41.7% and 60.9% respectively who had experienced low blood sugar. The Chi squared test analysis indicated no association between the variables of gender and low blood sugar at the level of significance 5%, since p-values were 0.773 and 0.188.

Table 3.36.Cross tabulation between nationality and sex and low blood sugar.

Nationality/ Sex			Have you ever had a low blood sugar		Total
			Yes	No	
Kuwaiti	Male	n	13 (54.2%)	11(45.8%)	24
	Female	n	22 (57.9%)	16 (42.1%)	38
	Total	n/%	35 (56.5%)	27 (43.5%)	62 (10%)
Non-Kuwaiti	Male	n	14 (60.9%)	9 (39.1%)	23
	Female	n	10 (41.7%)	14 (58.3%)	24
	Total	n/%	24 (51.1%)	23 (48.9%)	47 (100%)

The part of the questionnaire which asked for measured values concerning low blood sugar provided some interesting results. For example, 31% of Kuwaiti males decided that the level of blood sugar was low when it reached 60mg/dL contrasting with 14% of Kuwaiti females. On other hand, the level of low blood sugar for non-Kuwaiti

males was considered to be 54 mg/dL (Table 3.37) although in many of the questionnaires 'other' was given. Moreover, Table 3.38 shows that 38% of Kuwaiti males thought that the level of blood sugar was low when it reached 40mg/dL while 70% of Kuwaiti females thought that the level of blood sugar was low when it reached 36mg/dL. On other hand, the level of low blood sugar for non-Kuwaiti males was considered to be 40 mg/dL by 46% of them.

Table 3.37. Cross tabulation between nationality and sex and value for low blood sugar which patients thought was too low.

Nationality/Sex			If yes how low does your blood sugar drop prior to noticing				Total
			60 mg/dL	54 mg/dL	50 mg/dL	Other*	
Kuwaiti	Male	n	4 (31%)	1(8%)	0	8 (62%)	13
	Female	n	3 (14%)	6 (29%)	2 (10%)	10 (48%)	21
	Total	n/%	7 (21%)	7 (21%)	2 (6%)	18 (53%)	34 (100%)
Non-Kuwaiti	Male	n	0	1(7%)	0	13 (93%)	14
	Female	n	3 (50%)	1(17%)	0	2 (33%)	6
	Total	n/%	3 (15%)	2 (10%)	0	15 (75%)	20 (100%)

*This group is further clarified in Table 3.38 below.

The Chi squared test found no association between sex and low blood sugar (p value = 0.246) for both Kuwaiti males and females.

Table 3.38. Cross tabulation between nationality and sex and other values for low blood sugar which patients thought was too low.

Nationality			Other hypoglycemia				Total
			36mg/dL	30mg/dL	45mg/dL	40mg/dL	
Kuwaiti	Male	n	2 (25%)	2 (25%)	1(13%)	3 (38%)	8
	Female	n	7 (70%)	0	1(10%)	2 (20%)	10
	Total	n/%	9 (50%)	2 (11%)	2 (11%)	(5%28) 5)	18 (100%)
Non-Kuwaiti	Male	n	5 (38%)	1(8%)	1(8%)	6 (46%)	13
	Female	n	1(50%)	1(50%)	0	0	2
	Total	n/%	6 (40%)	2 (13%)	1 (7%)	(%40) 6	15

Warning signs

The results obtaining from the analysis indicated that 54.2% and 57.9% of Kuwaiti males and females had warning signals; while 60.9% of non-Kuwaiti males and 41.7% of non-Kuwaiti females had had warning signals (see Table 3.39).

Table 3.39. Cross tabulation between nationality and sex and warning signals.

Nationality/Sex			Were there warning signals?		Total
			Yes	No	
Kuwaiti	Male	n	13 (54.2%)	11 (45.8%)	24
	Female	n	22 (57.9%)	16 (42.1%)	38
	Total	n/%	35 (56.5%)	27 (43.5%)	62 (100%)
Non-Kuwaiti	Male	n	14 (60.9%)	9 (39.1%)	23
	Female	n	10 (41.7%)	14 (58.3%)	24
	Total	n/%	24 (51.1%)	23 (48.9%)	47 (100%)

The percentage of females who had had warning signals was less than for males, 51.6% and 57.4% respectively (Table 3.40).

Table 3.40. Cross tabulation between sex and warning signals between both groups of patients.

Sex		Were there warning signals?		Total
		Yes	No	
Male	n	27 (57.4%)	20 (42.6%)	47
Female	n	32 (51.6%)	30 (48.4%)	62
Total	n/	59 (54.1%)	50 (45.9%)	109 (100%)

Nausea

Table 3.41 shows that 8.3% of Kuwaiti males had suffered nausea, compared with 34.2% of Kuwaiti females. In contrast, 17.4% of non-Kuwaiti males had suffered nausea, compared with 25% of non-Kuwait females who had suffered this condition.

Table 3.41. Cross tabulation between nationality and sex and suffering nausea.

Nationality/Sex			Nausea		Total
			No	Yes	
Kuwaiti	Male	n	22 (91.7%)	2 (8.3%)	24
	Female	n	25 (65.8%)	13 (34.2%)	38
	Total	n/%	47 (75.8%)	15 (24.2%)	62 (100%)
Non-Kuwaiti	Male	n	19 (82.6%)	4 (17.4%)	23
	Female	n	18 (75 %)	6 (25%)	24
	Total	n/%	37 (78.7%)	10 (21.3%)	47 (100%)

Numbness

Table 3.42 shows that both Kuwaiti males and females had suffered numbness, 12.5% and 34.2% respectively, while the non-Kuwaiti males and females the figures were 30.4% and 25% respectively.

Table 3.42. Cross tabulation between nationality and sex and suffering numbness.

Nationality/Sex			Numbness		Total
			No	Yes	
Kuwaiti	Male	n	21(87.5%)	3 (12.5%)	24
	Female	n	25 (65.8%)	13 (34.2%)	38
	Total	n/%	46 (74.2%)	16 (25.8%)	62 (100%)
Non-Kuwaiti	Male	n	16 (69.6%)	7 (30.4%)	23
	Female	n	18 (75%)	6(25%)	24
	Total	n/%	34 (72.3)	13 (27.7%)	47 (100%)

Anxiety

Table 3.43 shows that the percentage of Kuwaiti males who had experienced anxiety was greater than for Kuwaiti females, 8.3% versus 5.3%. No patients from the non-Kuwaiti group had suffered anxiety.

Table 3.43. Cross tabulation between nationality and sex and suffering anxiety.

Nationality/Sex			Anxiety		Total
			No	Yes	
Kuwaiti	Male	n	22 (91.7%)	2 (8.3%)	24
	Female	n	36 (94.7%)	2 (5.3%)	38
	Total	n/%	58 (93.5%)	4 (6.5%)	62 (100%)
Non-Kuwaiti	Male	n	23 (100%)	0	23
	Female	n	24 (100%)	0	24
	Total	n/%	47 (100%)	0	47 (100%)

Dizziness

From Table 3.44 we can see that 33.3% of male Kuwaiti and 42.1% for Kuwaiti females had suffered dizziness. The percentage of non-Kuwaiti males who experienced dizziness was more than for non-Kuwaiti females, 43.5% versus 20.8%.

Table 3.44 . Cross tabulation between nationality and sex and dizziness signal

Nationality/Sex			Dizziness		Total
			No	Yes	
Kuwaiti	Male	n	16 (66.7%)	8 (33.3%)	24
	Female	n	22 (57.9%)	16 (42.1%)	38
	Total	n/%	38 (61.3%)	24 (38.7%)	62 (100%)
Non-Kuwaiti	Male	n	13 (56.5%)	10 (43.5%)	23
	Female	n	19 (79.2%)	5 (20.8%)	24
	Total	n/%	32 (68.1%)	15 (31.9%)	47 (100%)

Headache

None of the Kuwaiti males suffered headaches whilst 23.7% of females had experienced headaches (Table 3.45). For the non-Kuwaiti sample, 30.4% of the males experienced headache contrasting with 16.7% of the females.

Table 3.45. Cross tabulation between nationality and sex and headache.

Nationality/Sex			Headache		Total
			No	Yes	
Kuwaiti	Male	n	24 (100%)	0	24
	Female	n	29 (76.3%)	9 (23.7%)	38
	Total	n/%	53 (85.5%)	9 (14.5%)	62 (100%)
Non-Kuwaiti	Male	n	16 (69.6%)	7 (30.4%)	23
	Female	n	20 (83.3%)	4 (16.7%)	24
	Total	n	36 (76.6%)	11(23.4%)	47 (100%)

Other “signals” of diabetes.

41.7% of Kuwaiti males experienced other pain(s) in the body and blurred vision, while the figure was 34.2% for Kuwaiti females. For the non-Kuwaiti sample, 43.5% and 29.2% of males and females experienced other pain(s) in the body and blurred vision, respectively.

Hypoglycemia

Table 3.46. Cross tabulation between nationality and sex and hypoglycemia.

Nationality/ Sex			Hypoglycemia		Total
			No	Yes	
Kuwaiti	Male	n	14 (58.3%)	10 (41.7%)	24
	Female	n	25 (65.8%)	13 (34.2%)	38
	Total	n/%	39 (62.9%)	23 (37.1%)	62 (100%)
Non-Kuwaiti	Male	n	13 (56.5%)	10 (43.5%)	23
	Female	n	17 (70.8%)	7 (29.2%)	24
	Total	n/%	30 (63.8%)	17 (36.2%)	47 (100%)

Table 3.47 shows that 77% of Kuwaiti males reported that the duration of suffering from symptoms was 1 to 2 years or 2 to 3 years comparing with 63.7% of Kuwaiti females. Within the non - Kuwaiti sample, 93% of males and 70% of females reported that the duration of suffering from Symptoms was 1 to 2 years or 2 to 3 years.

Table 3.47. Cross tabulation between nationality and sex and duration of suffering from symptoms of hypoglycemia.

Nationality/Sex			For how many years you have been suffering any of these symptoms					Total
			1-2 Years	2-3 Years	3-4 Years	4-5 Years	5 Years or more	
Kuwaiti	Male	n	6(46.2%)	4(30.8%)	2(15.4%)	0	1(7.7%)	13
	Female	n	8(36.4%)	6(27.3%)	2(9.1%)	1(4.5%)	5(22.7%)	22
	Total	n	14	10	4	1	6	35
		%	40.0%	28.6%	11.4%	2.9%	17.1%	100%
Non-Kuwaiti	Male	n	9(64.3%)	4(28.6%)	0	0	1(7.1%)	14
	Female	n	6 (60%)	1(10%)	1(10%)	1(10%)	1(10%)	10
	Total	n	15	5	1	1	2	24
		%	62.5%	20.8%	4.2%	4.2%	8.3%	100%

Using the Chi-Square Test there was no association between nationality and the duration of suffering from symptoms of hypoglycemia according to sex, since the p values were 0.702 and 0.428.

Table 3.48 shows that 69.2% of Kuwaiti males reported that hypoglycemia affected their lifestyle, while this percentage was higher, 86.4% for Kuwaiti females. For non-Kuwaitis members 100% of the females and 85.7% of the males commented that it affected their lifestyle.

Table 3.48. Cross tabulation between nationality and sex and effecting of hypoglycemia on lifestyle.

Nationality/ Sex			Does hypoglycemia affect your lifestyle		Total
			Yes	No	
Kuwaiti	Male	n	9 (69.2%)	4(30.8%)	13
	Female	n	19 (86.4%)	3 (13.6%)	22
	Total	n/%	28 (80%)	7 (20%)	35 (100%)
Non-Kuwaiti	Male	n	12 (85.7%)	2 (14.3%)	14
	Female	n	10 (100%)	0	10
	Total	n/%	22 (91.7%)	2 (8.3%)	24 (100%)

Table 3.49 shows that 8.3% of Kuwaiti males reported that they had had severe hypoglycemic spells in the past 5 years while this percentage was slightly higher, 13.2%, for Kuwaiti females. For non-Kuwaiti males, 34.8% of them reported that they had had severe hypoglycemic spells in the past 5 years, while this figure for non-Kuwaiti females was 12.5%.

Table 3.49. Cross tabulation between nationality and sex and severe hypoglycemic spells in the past 5 years.

Nationality/Sex			Have you had severe hypoglycemic spells in the past 5 years		Total
			Yes	No	
Kuwaiti	Male	n	2 (8.3%)	22 (91.7%)	24
	Female	n	5 (13.2%)	33 (86.8%)	38
	Total	n/%	7 (11.3%)	55 (88.7%)	62 (100%)
Non-Kuwaiti	Male	n	8 (34.8%)	15 (65.2%)	23
	Female	n	3 (12.5%)	21 (87.5%)	24
	Total	n/%	11 (23.4%)	36 (76.6%)	47 (100%)

Convulsions and Coma.

From the data the incident of **convulsions** was very rare. Only 1 Kuwaiti male and 2 females had suffered such an effect. Additionally, one non- Kuwaiti male reported that he had suffered from convulsions whereas none of the females had experienced this problem.

For **coma** the figures were: One Kuwaiti male and female and for the non-Kuwaitis, just one female. Those affected as described in Table 3.50.

Table 3.50. Cross tabulation between Nationality and Sex and type of severe diabetic problems namely convulsions and coma.

Nationality/ Sex			If Yes, which of the following					Total
			Convulsions	Coma	Convulsions, heart problem and low temperature	Unconscious & low body temperature	Heart problem & low body temperature	
Kuwaiti	Male	n	1(50%)	1(50%)	0	0	0	2
	Female	n	2(40%)	1(20%)	2(40%)	0	0	5
	Total	n	3	2	2			7
		%	43%	29%	28%			100%
Non-Kuwaiti	Male	n	1(13%)	0	5 (62%)	1(12.5%)	1(12.5%)	8

	Female	n	0	1(33%)	2 (66.7%)	0	0	3
	Total	n	1	1	7	1	1	11
		%	9.1%	9.1%	63.6%	9.1%	9.1%	100%

Duration of symptoms of these conditions.

Table 3.51 shows that 40% of Kuwaiti females who answered the question reported that the duration of severe was 3 to 4 times or greater over the last five years. 66.7% of non-Kuwaiti females who reported such events experienced them 1 to 2 times over the last five years.

Table 3.51. Cross tabulation between nationality and sex and number of events over the last five years

Nationality/Sex			Please indicate number of events over the last five years					Total
			1-2 Times	2 -3 Times	3-4 Times	4-5 Times	More than 5 Times	
Kuwaiti	Male	n	1 (50%)	0	0	1(50%)	0	2
	Female	n	1(20%)	0	2(40%)	1(20%)	1(20%)	5
	Total	n	2	0	2	2	1	7
		%	28.6%	0	28.6%	28.6%	14.3%	100%
Non-Kuwaiti	Male	n	4 (50%)	1(12.5%)	2(25%)	1(12.5%)	0	8
	Female	n	2 (66.7%)	0	1(33.3%)	0	0	3
	Total	n	6	1	3	1	0	11
		%	54.5%	9.1%	27.3%	9.1%		100%

In addition, some of the sample patients verbally reported that when they go into a coma, they cannot move, suffer drowsiness, are always tired, cannot do anything, always feel sleepy, fatigued, weakness, suffering nervousness and are angry, as they cannot check on their children and their homes, and have to take sick leave from their work as they cannot walk.

Hyperglycemia

Table 3.52 shows that 33.3% of Kuwaiti males did not test their urine for ketones, and 54.2% of them did not know what ketones actually were or indicated, and while 26.3% of Kuwaiti females tested their urine for ketones, 47.4% of them did not know what ketones actually were or indicated. For non-Kuwaiti patients, 34.8% of males tested for urine for ketones, and 52.2% of them did not know what ketones were. Additionally, 79.2% of the non-Kuwaiti females did not know what ketones were.

Table 3.52. Cross tabulation between nationality and test for urine for ketones.

Nationality/ Sex			Do you test for urine for ketones			Total
			Yes	No	Don't know what ketones are	
Kuwaiti	Male	n	3 (12.5%)	8 (33.3%)	13 (54.2%)	24
	Female	n	10 (26.3%)	10(26.3%)	18 (47.4%)	38
	Total	n	13	18	31	62
		%	21.0%	29.0%	50.0%	100%
Non-Kuwaiti	Male	n	8 (34.8%)	3(13%)	12 (52.2%)	23
	Female	n	3 (12.5%)	2 (8.3%)	19 (79.2%)	24
	Total	n	11	5	31	47
		%	23.4%	10.6%	66.0%	100%

On analysis of the data shown in table 50 there was no association between nationality and making test for urine for ketones according to sex, since the p-values were 0.422 and 0.133 (Chi-Square Test).

Ketoacidosis

Table 3.53 shows that 6 Kuwaiti females had ketoacidosis 1-2 times a year, while a further 1 had ketoacidosis for more than 5 times a year. Three Kuwaiti males and females had ketoacidosis 1-2 times a year.

Table 3.53. Cross tabulation between nationality and sex and having ketoacidosis

Nationality/Sex			If Yes, please indicate how often you have 'been in' ketoacidosis					Total
			1-2 times a year	2-3 times a year	3-4 times a year	4-5 times a year	more than 5 times a year	
Kuwaiti	Male	n	0	0	1(33.3%)	0	2 (66.7%)	3
	Female	n	6 (60%)	0	2 (20%)	1 (10%)	1 (10%)	10

	Total	n	6	0	3	1	3	13
		%	46.2%		23.1%	7.7%	23.1%	100%
Non-Kuwaiti	Male	n	3 (37.5%)	2(25%)	1(12.5%)	0	2(25%)	8
	Female	n	3(100%)	0	0		0	3
	Total	n	6	2	1		2	11
		%	54.5%	18.2%	9.1%		18.2%	100%

Table 3.54 shows that above 90% of the patients in the study reported that they had had warning signals due to hyperglycemia.

Table 3.54. Cross tabulation between nationality and sex warning signals due to hyperglycemia

Nationality/ Sex			Were there warning signals due to hyperglycemia?		Total
			Yes	No	
Kuwaiti	Male	n	22 (91.7%)	2(8.3%)	24
	Female	n	36 (94.7%)	2 (5.3%)	38
	Total	n	58	4	62
		%	93.5%	6.5%	100%
Non-Kuwaiti	Male	n	22 (95.7%)	1(4.3%)	23
	Female	n	22 (91.7%)	2 (8.3%)	24
	Total	n	44	3	47
		%	93.6%	6.4%	100%

Describe what happened:

In response to this open question a number of answers were given. These are summarized as: blurred vision, dizzy, drowsiness, dry mouth, fatigue, headache, hunger and frequent urination, increase of thirst, nausea, shivering, sweating, the body temperature increases, the blood glucose becomes 300mg/dl or more than 180mg/dl (about 252) or up to 300mg, the blood sugar is more than 100mg/dl, the heart beats increase. The answers reported by the sample were a single or in combination with others (see Appendix 11)

Table 3.55 shows that 27.3% of Kuwaiti males reported hyperglycemia occurring for 1 to 2 years, and 22.7% reported hyperglycemia occurring for five or more years. For Kuwaiti females 30.6% reported 1-2 years, 5.6% reported 3 to 4 years, and 36.1% for more than five years. For non-Kuwaitis the position was the similar to the Kuwaiti group especially in the first category (1-2 years). Generally, for both non-Kuwaitis males and females the range was greater than that for Kuwaitis.

Table 3.55. Cross tabulation between nationality and sex and duration of occurring hyperglycemia

Nationality/Sex			How many years has hyperglycemia been occurring					Total
			1-2 Years	2-3 Years	3-4 Years	4-5 Years	5 and Years	
Kuwaiti	Male	n	6(27.3%)	4(18.2%)	5(22.7%)	2(9.1%)	5(22.7%)	22
	Female	n	11(30.6%)	8(22.2%)	2(5.6%)	2(5.6%)	13(36.1%)	36
	Total	n	17	12	7	4	18	58
		%	29.3%	20.7%	12.1%	6.9%	31.0%	100%
Non-Kuwaiti	Male	n	6(27.3%)	7(31.8%)	4(18.2%)	1(4.5%)	4(18.2%)	22
	Female	n	8(36.4%)	4(18.2%)	4(18.2%)	3(13.6%)	3(13.6%)	22
	Total	n	14	11	8	4	7	44
		%	31.8%	25.0%	18.2%	9.1%	15.9%	100%

Using the Chi-Square Test there was no association between nationality and length of occurring hyperglycemia attributed to sex, since the p-values were 0.339 and 0.690.

Kidney

This question highlighted a very interesting point about renal function when taken together with the **next question**. Essentially, question 23- suggesting they had no renal problems, contrasted with the result of question 24, when they reported protein in their urine. This suggested a mismatch between renal function and their knowledge of protein in urine.

Table 3.56 shows the percentage of patients knowing they had kidney problems. Among Kuwaiti group 12.5% and 13.2% of males and females knowing they had kidney problems, while the results indicated that 21.7% and 16.7% of non-Kuwaiti males and females knowing they had kidney problems.

Table 3.56. Cross tabulation between nationality and sex and knowing they had a kidney problem.

Nationality/ Sex			Have you ever been told by your doctor you have a kidney problem			Total
			Yes	No	I Don't know	
Kuwaiti	Male	n	3(12.5%)	21(87.5%)	0	24
	Female	n	5(13.2%)	32(84.2%)	1(2.6%)	38
	Total	n	8	53	1	62
		%	12.9%	85.5%	1.6%	100%

Non-Kuwaiti	Male	n	5 (21.7%)	17(73.9%)	1(4.3%)	23
	Female	n	4(16.7%)	19(79.2%)	1(4.2%)	24
		%	16.7%	79.2%	4.2%	100%
	Total	n	9	36	2	47
		%	19.1%	76.6%	4.3%	100%

There was no association between nationality and knowing they had kidney problems attributed to sex; (p 0.721 and 0.904 Chi-Square Test).

Table 3.57 shows that only 3 males and 5 females from group one (Kuwaiti) added to 5 males and 4 females from group two (non-Kuwaiti) answered this question. About 33% of Kuwaiti females stated that the time since diagnosis was about 3 years, while 60% of non-Kuwaiti males stated that the time since diagnosis was about 1 year.

Table 3.57. Cross tabulation between nationality and sex and length of diagnosis.

Nationality/ Sex			if so, please indicate the time since diagnosis					Total
			1 Year	2 Years	3 Years	4 Years	Other	
Kuwaiti	Male	n	1 (33.3%)	0	1(33.3%)	1(33.3%)	0	3
	Female	n	1(20%)	0	2(40%)	1(20%)	1(20%)	5
	Total	n	2		3	2	1	8
		%	25.0%		37.5%	25.0%	12.5%	100%
Non-Kuwaiti	Male	n	3(60.0%)	1(20%)	1(20.0%)	0	0	5
	Female	n	0	3(75%)	1(25%)	0	0	4
	Total	n	3	4	2	0	0	9
		%	33.3%	44.4%	22.2%	0	0	100%

Protein in the urine.

Table 3.58 shows that 67.7% of Kuwaitis and 63.8% non-Kuwaitis stated they had no protein in their urine. Additionally, 9.7% of Kuwaitis and 14.9% of non-Kuwaitis stated they did not know whether they had been diagnosed as having protein in their urine or not. Finally, 22.6% of Kuwaitis and 21.3% of non-Kuwaitis stated they had protein in the urine.

Table 3.58. Cross tabulation between nationality and sex and having protein in your urine

Nationality/Sex			Have you been diagnosed as having protein in your urine?			Total
			Yes	No	I don't know	
Kuwaiti	Male	n	7(29.2%)	17(70.8%)	0	24
	Female	n	7(18.4%)	25(65.8%)	6(15.8%)	38
	Total	n	14	42	6	62
		%	22.6%	67.7%	9.7%	100%
Non-Kuwaiti	Male	n	5(21.7%)	13(56.5%)	5 (21.7%)	23
	Female	n	5(20.8%)	17 (70.8%)	2 (8.3%)	24
	Total	n	10	30	7	47
		%	21.3%	63.8%	14.9%	100%

Patients concern about renal problems

This generated the lowest answer rate of any the questions asked.

Extension of the data from the above table (Table 3.58), 2 Kuwaiti patients (one male and one female), and one non-Kuwaiti patient (female) reported that they were transferred from their diabetic physician to a nephrologist. This is only three out of 109 in the study. Despite the non-Kuwaiti female saying she had ‘no renal problems’ she had sufficient protein in her urine to be transferred to a nephrologist. Despite this, she stated that she did not have any problem with her kidneys. Therefore, she knew there was protein in her urine but she did associate this with her kidneys. The other two patients, both Kuwaitis, who knew they had a kidney problem, were not actually transferred to a nephrologist.

Renal dialysis and renal transplants

Only three Kuwaiti patients, one male two females and only one non- Kuwaiti female patient reported that they required dialysis. All these patients (n=4) stated that their dialysis schedule was 3 visits per week. In addition, only 2 Kuwaiti had received a kidney transplant, one male and one female. Table 3.59 shows that 69.4% of Kuwaitis and 61.7% of non-Kuwaiti had high blood pressure. Moreover, the percentage of female among the two groups who had high blood pressure was greater than the percentage of male among the two groups who had this problem.

Table 3.59. Cross tabulation between nationality and sex and having high blood pressure.

Nationality/ Sex			Do you have high blood pressure?		Total
			Yes	No	
Kuwaiti	Male	n	12 (50%)	12 (50%)	24
	Female	n	31(81.6%)	7(18.4%)	38
	Total	n	43	19	62
		%	69.4%	30.6%	100%
Non-Kuwaiti	Male	n	14(60.9%)	9(39.1%)	23
	Female	n	15(62.5%)	9(37.5%)	24
	Total	n	29	18	47
		%	61.7%	38.3%	100%

Within the study patient groups those who had a high blood pressure, 99% of these patients reported that they were taking medication due to high blood pressure and a further one although hypertensive was not taking any medication.

When asked to provide the names of their medication, 87% of the sample members reported that they took: Zestril 10, Diovan, Norvasak, Twynsta or Diovan (valsartan) and Norvasc (Amlodipine) instead, Nifedipine, Tenormin 100mg(Atenolol), Zestril (Lisinopril), Capoten (Captopril) Lasix (Furosemide) - Zestoretic - (Hydrochlorothiazide), while the 13% of them reported that they didn't remember the medication that they took. Generally, For Non-Kuwaitis prescribing of drugs was slightly different from Kuwaitis because if expensive drugs were required the patient would have to pay for them themselves rather than receiving them from the Kuwaiti system. With this caveat - their prescribed drugs are shown in both generic and proprietary names to avoid the complications of just using proprietary names as these can vary from country to country. See Appendix 10 for a full list of drugs.

Eye – Table 3.60 shows that 66.7% of Kuwaiti males 71.1% of Kuwaiti females had their retinas examined. For non-Kuwaitis the figures were: 56.5% of the males and 41.7% of the females had had their retinas examined.

Table 3.60. Cross tabulation between nationality and sex and examined the retina

Nationality/ Sex			Have you ever had the back of your eyes (the retina) examined		Total
			Yes	No	
Kuwaiti	Male	n	16(66.7%)	8(33.3%)	24
	Female	n	27(71.1%)	11(28.9%)	38
	Total	n	43	19	62
		%	69.4%	30.6%	100%
Non-Kuwaiti	Male	n	13(56.5%)	10 (43.5%)	23
	Female	n	10(41.7%)	14(58.3%)	24
	Total	n	23	24	47
		%	48.9%	51.1%	100%

The Chi-Square Test indicated there was no association between nationality and examination of the retina attributed to sex since p-values were 0.715 and 0.308. From table 3.61 we can see 31.2% of Kuwaiti males indicated that the specialist who conducted their eye examination was a diabetes specialist, while 68.8% indicated that the specialist who conducted the eye examination was an eye specialist. 46.2% of non-Kuwaiti males indicate that specialist who conducted the eye examination was a diabetes specialist, while 53.8% indicated just an eye specialist. Moreover, 48.1% of

Kuwaiti females and 50% non-Kuwaiti females respectively indicated that their eye examination was by a diabetes specialist.

Table 3.61. Cross tabulation between nationality and sex and type of specialist who conducted the eye examination.

Nationality/ Sex			If yes who conducted the eye examination		Total
			A diabetes specialist	An eye specialist	
Kuwaiti	Male	n	5(31.2%)	11(68.8%)	16
	Female	n	13 (48.1%)	14(51.9%)	27
	Total	n	18	25	43
		%	41.9%	58.1%	100%
Non-Kuwaiti	Male	n	6 (46.2%)	7(53.8%)	13
	Female	n	5 (50%)	5 (50%)	10
	Total	n	11	12	23
		%	47.8%	52.2%	100%

There was no significant association between nationality and type of specialist who conducted the eye examination attributed to sex (p-values , 0.278 and 0.855).

The result from Table 3.62 found that routine eye examination for patients in the diabetic clinics does not occur for 45.2% of Kuwaiti and for 66% of non-Kuwaitis patients.

Table 3.62. Cross tabulation between nationality and sex and frequency of visiting eye doctor

Nationality/ Sex			How many times do you see eye doctor					Total
			1 Per month	1-2 Per year	2-3 Per year	other	Never	
Kuwaiti	Male	n	0	5 (20.8%)	1(4.2%)	7(29.2%)	11(45.8%)	24
	Female	n	2(5.3%)	2(5.3%)	0	17(44.7%)	17(44.7%)	38
	Total	n	2	7	1	24	28	62
		%	3.2%	11.3%	1.6%	38.7%	45.2%	100%
Non-Kuwaiti	Male	n	0	4(17.4%)	1(4.3%)	4(17.4%)	14(60.9%)	23
	Female	n	1(4.2%)	1(4.2%)	1(4.2%)	4(16.7%)	17(70.8%)	24
	Total	n	1	5	2	8	31	47
		%	2.1%	10.6%	4.3%	17.0%	66.0%	100%

No significant association between nationality and frequency of visiting eye doctor was attributed to sex since p-values were 0.140 and 0.546.

The results shows in Table 3.63 indicate that diabetes blurred vision is a problem in 88.7% of Kuwaiti patients and 87.2% of the Non- Kuwaiti patients.

Table 3.63. Cross tabulation between nationality and sex and having diabetic blurred vision

Nationality/ Sex			Do you have diabetic blurred vision as a result of you diabetes?		Total
			Yes	No	
Kuwaiti	Male	n	20(83.3%)	4(16.7%)	24
	Female	n	35(92.1%)	3 (7.9%)	38
	Total	n	55	7	62
		%	88.7%	11.3%	100%
Non-Kuwaiti	Male	n	19 (82.6%)	4(17.4%)	23
	Female	n	22(91.7%)	2(8.3%)	24
	Total	n	41	6	47
		%	87.2%	12.8%	100%

The results shows in Table 3.64 indicate that decreased in clearness of vision is a problem in 88.7% of Kuwaiti patients and 80.9% of the Non- Kuwaiti patients.

Table 3.64. Cross tabulation between nationality and sex and diagnosed with a decreased in clearness of vision.

Nationality/ Sex			Have you been diagnosed with a decreased in clearness of vision?		Total
			Yes	No	
Kuwaiti	Male	n	20(83.3%)	4(16.7%)	24
	Female	n	35(92.1%)	3(7.9%)	38
	Total	n	55	7	62
		%	88.7%	11.3%	100%
Non-Kuwaiti	Male	n	19(82.6%)	4(17.4%)	23
	Female	n	19(79.2%)	5(20.8%)	24
	Total	n	38	9	47
		%	80.9%	19.1%	100%

No significant association between nationality and being diagnosed with a decreased in clearness of vision attributed to sex (p-values, 0.288 and 0.764).

Table 3.65. Cross tabulation between nationality and sex and foot problem

Nationality/ Sex			Have you ever had foot problem		Total
			Yes	No	
Kuwaiti	Male	n	17(70.8%)	7(29.2%)	24
	Female	n	26(68.4%)	12(31.6%)	38
	Total	n/%	43 (69.4%)	19 (30.6%)	62 (100%)
Non-Kuwaiti	Male	n	10(43.5%)	13(56.5%)	23
	Female	n	20(83.3%)	4(16.7%)	24
	Total	n/%	30 (63.8%)	17 (36.2%)	47 (100%)

There was no significant association between nationality (Kuwaiti) and having a foot problem attributed to sex since p-value was 0.841, but there was a highly significant association between nationality (non-Kuwaiti) and having foot problem attributed to sex ($p = 0.004$).

Numbness

The data for this is shown in Table 3.66 and there was no significant association between nationality (Kuwaiti) and suffering from numbness attributed to sex under the 5% level of significance; since p-value was 0.245, but there is a high significance association between nationality (non-Kuwaiti) and suffering from numbness attributed to sex under the 5% level of significance; since the p-value was 0.013.

Table 3.66. Cross tabulation between nationality and sex and suffering from numbness

Nationality/ Sex			Suffer from numbness		Total
			Yes	No	
Kuwaiti	Male	n	15(62.5%)	9(37.5%)	24
	Female	n	18(47.4%)	20(52.6%)	38
	Total	n/%	33 (53.2%)	29 (46.8%)	62 (100%)
Non-Kuwaiti	Male	n	9(39.1%)	14(60.9%)	23
	Female	n	18(75%)	6(25%)	24
	Total	n/%	27 (57.4%)	20 (42.6%)	47 (100%)

‘Burning’

The data is shown in Table 3.67 and after analysis we can conclude that there is no significant association between nationalities and suffering from problem burning attributed to sex under 5% level of significance; since p-values were 0.213 and 0.110.

Table 3.67. Cross tabulation between nationality and sex and suffering from problem of ‘burning’.

Nationality/ Sex			Suffer from Burning		Total
			Yes	No	
Kuwaiti	Male	n	14(58.3%)	10(41.7%)	24
	Female	n	16(42.1%)	22(57.9%)	38
	Total	n/%	30 (48.4%)	32 (51.6%)	62 (100%)
Non-Kuwaiti	Male	n	10(43.5%)	13(56.5%)	23
	Female	n	16(66.7%)	8(33.3%)	24
	Total	n/%	26 (55.3%)	21 (44.7%)	47 (100%)

Foot ulcers - In this group of patients (n=109) only four had foot ulcers (Table 3.68), three of them were Kuwaiti patients, two men and one women, and the fourth one was a non- Kuwaiti woman.

Table 3.68. Cross tabulation between nationality and sex and suffering from foot ulcers.

Nationality/ Sex			Suffer from Foot ulcer		Total
			Yes	No	
Kuwaiti	Male	n	2 (8.3%)	22 (91.7%)	24
	Female	n	1 (2.6%)	37 (97.4%)	38
	Total	n/%	3 (4.8%)	59 (95.2%)	62(100%)
Non-Kuwaiti	Male	n	0	23 (100%)	23
	Female	n	1 (4.2%)	23 (95.8%)	24
	Total	n/%	1 (2.1%)	46 (97.9%)	47 (100%)

There was no significant association between nationality (Kuwaiti) and suffering from foot ulcers attributed to sex at a 5% level of significance, since the p-value was 0.456.

Other problems

The results shown in Table 3.69 indicate that 14.5% Kuwaiti patients and only 2.1% of non-Kuwaiti patients suffered from ‘other problems’. Females who were suffering from other problems described their problems in the following way. After walking for either short or long distances, they described the pain in their feet as ‘like needles being inserted into the foot’. One of them, described the consequences of having half both feet being amputated because her diabetes. This made walking impossible and so compromising her mobility. This woman also had ulcerated and infected areas on her upper, lower leg, which were fortunately treated by therapy in Thailand. In addition, one of them commented that she had severing itching in both feet, which disturbed her ability to sleep and walking.

Table 3.69. Cross tabulation between nationality and sex and suffering from other problems

Nationality/ Sex			Suffer from Other problems		Total
			Yes	No	
Kuwaiti	Male	n	2 (8.3%)	22 (91.7%)	24
	Female	n	7 (18.4%)	31(81.6%)	38
	Total	n/%	9 (14.5%)	53 (85.5%)	62 (100%)
Non-Kuwaiti	Male	n	0	23 (100%)	23
	Female	n	1 (4.2%)	23 (95.8%)	24
	Total	n/%	1 (2.1%)	46 (97.9%)	47 (100%)

After analysis there was no significant association between nationality and suffering from other problems attributed to sex under 5% level of significance; since p-values were 0.272 and 0.322.

Circulation

The results shows in Table 3.70 were those generated by question 34 and contained a perhaps expected finding. 35.5% of the sample who had cardiac problems were Kuwaiti, while 21.3% were non-Kuwaiti. The Kuwaiti patients who had cardiac problems were seven males and 15 were females, in contrast to the literature where the majority of heart problems would be male. The type of cardiac problems experienced by the Kuwaiti patients was that of chest pain. Among non-Kuwaitis, five males and five females had cardiac problems.

Table 3.70 Cross tabulation between nationality and sex and suffering from heart problems.

Nationality/ Sex			Have you ever had heart problems		Total
			Yes	No	
Kuwaiti	Male	n	7 (29.2%)	17 (70.8%)	24
	Female	n	15 (39.5%)	23 (60.5%)	38
	Total	n/%	22 (35.5%)	40 (64.5%)	62 (100%)
Non-Kuwaiti	Male	n	5 (21.7%)	18 (78.3%)	23
	Female	n	5 (20.8%)	19 (79.2%)	24
	Total	n/%	10 (21.3%)	37 (78.7%)	47 (100%)

No significant association between nationality and heart problems attributed to sex, p-value were 0.409 and 0.940.

Lipids - Both groups of patients took anti-cholesterol drug with more (n=37) Kuwaiti than Non-Kuwaiti (n=30) using such medications.

Table 3.71. Cross tabulation between nationality and sex and taking medications for high cholesterol.

Nationality/ Sex			Do you take any medication for high cholesterol?			Total
			Yes	No	I Don't know	
Kuwaiti	Male	n	11(45.8%)	13 (54.2%)	0	24
	Female	n	26 (68.4%)	10 (26.3%)	2(5.3%)	38

	Total	n/%	37 (59.7%)	23 (37.1%)	2 (3.2%)	62 (100%)
Non-Kuwaiti	Male	n	14 (60.9%)	9 (39.1%)	0	23
	Female	n	16 (66.7%)	8 (33.3%)	0	24
	Total	n/%	30 (63.8%)	17 (36.2%)	0	47 (100%)

After analysis there was no significant association between nationality and taking any medication for high cholesterol attributed to sex under 5% level of significance; since the p-values were 0.061 and 0.679.

Duration of medication for high cholesterol.

Only six Kuwaiti males were receiving such treatment and this had been in taken for 4 years. For Kuwaiti women the “picture” was more complicated as shown in Table 3.72 eight patients had received such treatment for 10 years or more, and five for six years, three for four years and finally six for one year. For Non-Kuwaitis, four males (out of 14) had received the therapy for two years and three for four years, and four women in this group (out of 16) had taken the medication for one year and three of them for two years.

Table 3.72. Cross tabulation between nationality and sex and length of time taking any medication for high cholesterol

Nationality / Sex			if yes, how long have you taken it									Total
			1 yrs.	2 yrs.	3 yrs.	4 yrs.	5 yrs.	6 yrs.	8 yrs.	10 yrs.	^ 10 yrs.	
Kuwaiti	Male	N	0	1	0	6	2	2		0	0	11
		%	0%	9%	0%	55%	18%	18%		0%	0	100%
	Female	N	6	2	3	3	0	5		5	3	27
		%	22%	7%	11%	11%	0%	19%		19%	11%	100%
	Total	N	6	3	3	9	2	7		5	3	38
		%	16%	8%	8%	24%	5%	18%		13%	8%	100%
Kal	N	1	4	2	3	1	1	0	0	0	2	14

		%	7%	29%	14%	21%	7%	7%	0%	0%	14%	100%
	Female	N	4	3	3	2	1	0	1	1	1	16
		%	25%	19%	19%	13%	6%	0%	6%	6%	6%	100%
	Total	N	5	7	5	5	2	1	1	1	3	30
		%	17%	23%	17%	17%	7%	3%	3%	3%	10%	100%

When this data was compared using the Chi-Square Test there was no significant association between nationality (non-Kuwaiti) and length of taking any medication for high cholesterol attributed to sex (p 0.696), but there is a significance association (p 0.034) between nationality (Kuwaiti) and length of taking any medication for high cholesterol attributed to sex.

3.5 Behavioral measures- lifestyle

Smoking habits (Table 3.73) found that 62.5% of Kuwaiti males were smokers, while only 2.6% of Kuwaiti females were smokers. Among the non-Kuwaiti group, 39.1% of males were smokers, and 8.3% of females were smokers. We can see that the incidence is for men to smoke more than the women in both groups of patients.

Table 3.73. Cross tabulation between nationality and sex and smoking:

Nationality/Sex			Have you ever smoked cigarettes?		Total
			Yes	No	
Kuwaiti	Male	n	15(62.5%)	9 (37.5%)	24
	Female	n	1(2.6%)	37 (97.4%)	38
	Total	n/%	16 (25.8%)	46 (74.2%)	62 (100%)
Non-Kuwaiti	Male	n	9 (39.1%)	14 (60.9%)	23
	Female	n	2 (8.3%)	22 (91.7%)	24
	Total	n/%	11 (23.4%)	36 (76.6%)	47 (100%)

There was a highly significant association between sex and smoking under 1% level of significance, since the p-values were 0.0000 male versus female.

Smokers in the Kuwaiti group (n=16) all of the men (n=15) and one woman had smoked for 5 years or more, and for the males in non-Kuwaiti group 88.9% of them

had smoked for 5 years or more. One non-Kuwaiti female had smoked for 4 years, and one non-Kuwaiti female had smoked for 5 years or more (Table 3.74).

Table 3.74. Cross tabulation between nationality, sex and length of practicing smoking:

Nationality/ Sex			If yes, when did you start smoking			Total
			2 Years	4 Years	5 Years or more	
Kuwaiti	Male	n	0	0	15(100%)	15
	Female	n	0	0	1 (100%)	1
	Total	n/%	0	0	16 (100%)	16
Non-Kuwaiti	Male	n	1 (11.1%)	0	8(88.9%)	9
	Female	n	0	1(50%)	1(50%)	2
	Total	n/%	1 (9.1%)	1 (9.1%)	9 (81.8%)	1(100%)

Using the Chi-Square Test there was a significant association between sex and length of practicing smoking, since the p-values was 0.015.

Alcohol intake

Since only two Kuwaiti's reported drinking alcohol and only three non- Kuwaiti reported that, it was only possible to carry out the analysis shown in Table 3.75.

Table 3.75 . Relationship between nationality and sex and drinking alcohol:

Nationality/ Sex			Do you drink alcohol		Total
			Yes	No	
Kuwaiti	Male	n	2(8.3%)	22(91.7%)	24
	Female	n	0	38(100%)	38
	Total	n	2 (3.2 %)	60 (96.8%)	62 (100%)
Non-Kuwaiti	Male	n	2(8.7%)	21(91.3%)	23
	Female	n	1(4.2%)	23(95.8%)	24
	Total	n	3 (6.4%)	44 (93.6%)	47 (100%)

Four patients (two Kuwaiti males and two non-Kuwaiti males) out of five who drink alcohol indicate that they have consumed it for 5 years or more, while the 5th patient (Non- Kuwaiti female) report that she had consumed it for one year. In addition, three of the patients (n= 5) who drink alcohol indicated that their normal beverage is beer only, while the others indicated that their normal beverage was beer, wine and spirit (see Table 3.76).

Table 3.76. Relationship between nationality, sex and length of drinking alcohol (years): in Non-Kuwaitis

Nationality/ Sex			If yes, how long have you taken it?		Total
			1 Year	5 Years or more	
Kuwaiti	Male	n	0	2	2
	Total	n	0	2	2
Non-Kuwaiti	Male	n	0	2	2
	Female	n	1	0	1
	Total	n	1	2	3

Additional tables:

Table 3.77. Sex * Body weight at this time of first diagnosis (Kg) * what course of action was recommended when you were first diagnosed? Cross tabulation

What course of action was recommended when you were first diagnosed?			Body weight at this time of first diagnosis (Kg)						Total
			50-59	60-69	70-79	80-89	90-99	100+	
Tablets medication	Male	n	1	4	8	6	6	8	33
		%	3%	12%	24%	18%	18%	24%	100%
	Female	n	4	6	13	8	13	6	50
		%	8.0%	12%	26.0%	16.0%	26.0%	12.0%	100%
	Total	n	5	10	21	14	19	14	83
		%	6%	12%	25%	17%	23%	17%	100%
Dietary change	Male	n	0	0	0	0	0	1	1
		%	0%	0%	0%	0%	0%	100%	100%
	Female	n	0	1	0	1	2	0	4
		%	0%	25%	0%	25.0%	50.0%	0%	100%
	Total	n	0	1	0	1	2	1	5
		%	0%	20%	0%	20%	40.0%	20.0%	100%
Insulin	Male	n	0	2	4	1	0	0	7
		%	0%	29%	57%	14%	0%	0.0%	100%
	Female	n	0	0	1	1	0	1	3
		%	0%	0%	33.3%	33.3%	0%	33.3%	100%
	Total	n	0	2	5	2	0	1	10
		%	0%	20%	50%	20%	0%	10%	100%
Tablet medication, dietary change & exercise	Male	n	0	0	1	0	0	0	1
		%	0%	0%	100%	0%	0%	0%	100%
	Total	n	0	0	1	0	0	0	1
		%	0%	0%	100%	0%	0%	0%	100%
Tablet medication & dietary change	Male	n	0	0	0	0	1	0	1
		%	0%	0%	0%	0%	100%	0%	100%
	Female	n	0	0	1	1	1	0	3
		%	0%	0%	33.3%	33.3%	33.3%	0%	100%
	Total	n	0	0	1	1	2	0	4
		%	0%	0%	25%	25%	50%	0%	100%
Tablet & exercise	Male	n	0	1	1	0	0	2	4
		%	0%	25%	25%	0%	0%	50%	100%

	Female	n	0	0	1	0	0	0	1
		%	0%	0%	100%	0%	0%	0%	100%
	Total	n	0	1	2	0	0	2	5
		%	0%	20%	40%	0%	0%	40%	100%
Dietary & exercise	Female	n	0	0	1	0	0	0	1
		%	0%	0%	100%	0%	0%	0%	100%
	Total	n	0	0	1	0	0	0	1
		%	0%	0%	100%	0%	0%	0%	100%

Table 3.78 . Sex * Body weight today (Kg) * what course of action was recommended when you were first diagnosed? Cross tabulation

What course of action was recommended when you were first diagnosed?			Body weight today (Kg)						Total
			50-59	60-69	70-79	80-89	90-99	100+	
Tablets medication	Male	n	0	6	8	7	5	7	33
		%	0%	18%	24%	21%	15%	21%	100%
	Female	n	3	11	10	14	8	4	50
		%	6%	22%	20%	28%	16%	8%	100%
	Total	n	3	17	18	21	13	11	83
		%	4%	21%	22%	25%	16%	13%	100%
Dietary change	Male	n	0	0	0	1	0	0	1
		%	0%	0%	0%	100%	0%	0%	100%
	Female	n	1	0	1	0	0	2	4
		%	25%	0%	25%	0%	0%	50%	100%
	Total	n	1	0	1	1	0	2	5
		%	20%	0%	20%	20%	0%	40%	100%
Insulin	Male	n	0	1	2	3	1	0	7
		%	0%	14%	29%	43%	14%	0%	100%
	Female	n	0	0	2	0	0	1	3
		%	0%	0%	67%	0%	0%	33%	100%
	Total	n	0	1	4	3	1	1	10
		%	0%	10%	40%	30%	10%	10%	100%
Tablet medication dietary change & exercise	Male	n	0	0	0	1	0	0	1
		%	0%	0%	0%	100%	0%	0%	100%
	Total	n	0	0	0	1	0	0	1
		%	0%	0%	0%	100%	0%	0%	100%
Tablet medication & dietary change	Male	n	0	0	0	1	0	0	1
		%	0%	0%	0%	100%	0%	0%	100%
	Female	n	0	0	0	2	1	0	3
		%	0%	0%	0%	67%	33%	0%	100%
	Total	n	0	0	0	3	1	0	4
		%	0%	0%	0%	75%	25%	0%	100%
Tablet & exercise	Male	n	2	0	0	0	0	2	4
		%	50%	0%	0%	0%	0%	50%	100%
	Female	n	0	0	1	0	0	0	1
		%	0%	0%	100%	0%	0%	0%	100%
	Total	n	2	0	1	0	0	2	5
		%	40%	0%	20%	0%	0%	40%	100%

Dietary & exercise	Female	n	0	1	0	0	0	0	1
		%	0%	100%	0%	0%	0%	0%	100%
	Total	n	0	1	0	0	0	0	1
		%	0%	100%	0%	0%	0%	0%	100%

Referring to Table 3.77 above, proportion of males with 100 or above kg weight who took tablets medication was 24% (n=8), followed by 24% of males with (70 to 79) kg weight took the same medication. Regarding females, 26% (n=13) of them with (70 to 79) kg weight took tablets medication, followed by 26% (n=13) of them with (90 to 99) kg weight took the same medication.

By cross-tabulating body weight today with sex regarding course of action was recommended at first diagnosed (Table 3.78), we observed that 24% of males (n=8) with (70 to 79) kg weight took tablets medication, while 21% of them who were 100 kg weight or above took that medication. It is clear from the second table that 28% of females (n=14) with (80-89) kg weight took the tablets medication followed by 22% of them who were between 60 to 69 kg weight took the same tablet.

Table 3.79 .Original Age * Do you have high blood pressure * Current Age * Gender

Gender	Current Age	Original Age		Do you have high blood pressure		Total
				Yes	No	
Male	30-34	30-39	n	1	0	1
			%	100%	0	100%
		Total	n	1	0	1
			%	100%	0	100%
	35-39	30-39	n	0	1	1
			%	0	100%	100%
		Total	n	0	1	1
			%	0	100%	100%
	40-44	20-29	n	0	2	2
			%	0.0%	100%	100%
		30-39	n	2	3	5
			%	40.0%	60.0%	100%
		40-49	n	0	1	1
			%	0.0%	100%	100%
		Total	n	2	6	8
			%	25.0%	75.0%	100%
	45-49	20-29	n	2	0	2
			%	100%	0.0%	100%
		30-39	n	2	3	5
			%	40.0%	60.0%	100%
		40-49	n	3	1	4
			%	75.0%	25.0%	100%
		Total	n	7	4	11
			%	63.6%	36.4%	100%

	50-54	30-39	n	2	0	2
			%	100%	0.0%	100%
		40-49	n	6	5	11
			%	50.0%	50.0%	100%
		50-59	n	0	1	1
			%	0.0%	100%	100%
		Total	n	8	6	14
			%	53.3%	46.7%	100%
	55-59	20-29	n	1	0	1
			%	100%	0	100%
		40-49	n	2	0	2
			%	100%	0	100%
		Total	n	3	0	3
			%	100%	0	100%
	60+	40-49	n	3	1	4
			%	66.7%	33.3%	100%
		50-59	n	2	0	2
			%	100%	0.0%	100%
		60+	n	1	3	4
			%	33.3%	66.7%	100%
		Total	n	6	4	10
			%	62.5%	37.5%	100%

Continuing:

Sex	Current Age	Original Age		Do you have high blood pressure		Total
				Yes	No	
Female	35-39	less than 20	n	0	1	1
			%	0.0%	100%	100%
		30-39	n	2	2	4
			%	50.0%	50.0%	100%
		Total	n	2	3	5
			%	40.0%	60.0%	100%
	40-44	30-39	n	2	2	4
			%	50.0%	50.0%	100%
		Total	n	2	2	4
			%	50.0%	50.0%	100%
	45-49	30-39	n	1	0	1
			%	100%	0	100%
		40-49	n	2	0	2
			%	100%	0	100%
		Total	n	3	0	3
			%	100%	0	100%
	50-54	20-29	n	1	0	1
			%	100%	0.0%	100%
		30-39	n	1	1	2
			%	50.0%	50.0%	100%
		40-49	n	8	5	13
			%	61.5%	38.5%	100%
		50-59	n	1	0	1
			%	100%	0.0%	100%
		Total	n	11	6	17
			%	64.7%	35.3%	100%
	55-59	30-39	n	2	0	2
			%	100%	0.0%	100%

		40-49	n	3	0	3
			%	100%	0.0%	100%
		50-59	n	1	1	2
			%	50.0%	50.0%	100%
		Total	n	6	1	7
			%	85.7%	14.3%	100%
	60+	30-39	n	7	0	7
			%	100%	0.0%	100%
		n	n	9	2	11
			%	81.8%	18.2%	100%
		50-59	n	4	2	6
			%	66.7%	33.3%	100%
		60+	n	2	0	2
			%	100%	0.0%	100%
		Total	n	22	4	26
			%	84.6%	15.4%	100%

Among the group of males, 11 patients who were 40-49 years old at the time of original diabetes diagnosis shifted to the next age group 50-54 which indicated that they had suffered diabetes for more than 10 years, and 50% of them (n=6) have high blood pressure. While among the group of females 13 patients who were 40-49 years old at the time of original diabetes diagnosis shifted to the next age group 50-54 which indicated that the diabetes stay with them for more than 10 years, and 61.5% of them (n=8) have high blood pressure. T-test indicated that no significant differences in percentages attributed to gender when studying the changing in age and having a high blood pressure.

3.6 Qualitative analysis of the full study.

Now I will focus on the *Closing Remarks and Comments* section on the questionnaire given to patients. The question asked was, ***"Do you have any comments to make regarding your condition, so that it may be used in medical research?"***

Their results revealed detailed information regarding the trends of diabetes patients in Kuwait. The questionnaire provided room, albeit limited, for patients to make general spontaneous comments about their disease and treatment. Since the answers to this question were open, no distinct classification group(s) was made in the results table. All the answers were translated from the patients comments made in colloquial Kuwaiti /or non-Kuwaiti Arabic into English. The Tables 3.80 (Non Kuwaiti patients) & 3.81 (Kuwaiti patients) given below, show the classification areas in which the patients commented upon. I have also included some additional interesting comments, which I felt were relevant to the topic in which they are listed.

Thematic analysis Due to the diversity of the comments made for the purpose of this thesis and to form part of the qualitative analysis of real patient comments a number of themes was devised, which are shown in the tables shown, which were gathered from their comments. The themes are given in the heading for the different columns.

Patients comments

Table 3.80. Non- Kuwaiti patients

Patient No	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	★													
2		★	★						★					
3	No comments													
4			★											
5	No comments													
6	No comments													
7				★	★									
8					★		★	★						
9							★							
10		★						★					★	
11				★	★									
12	No comments													
13			★				★	★						
14		★						★						
15		★						★						
16	★							★			★			
17	★													
18	★	★				★		★						
19			★					★						
20								★						
21		★						★	★					
22		★			★									
23								★			★			
24		★						★	★					
25		★					★							
26			★											
27					★		★	★	★					

28			★					★						
29			★				★	★						
30		★		★		★		★						
31	No comment													
32	No comment													
33		★						★						★
34								★	★					
A														
35		★						★						
36		★						★						★
37		★		★				★						
38							★	★						
39		★						★						
40		★					★	★						★
41	No comment													
42	No comment													
43	No comment													
44								★						
45		★	★					★						
A														
46				★										
47	★	★	★			★		★						

Patients 34, 45 (34, 45A), they did not transfer to a dietitian.

From this complex table two major areas of concern were found for non-Kuwaiti patients.

1. Lack of empathy (Dr/Nurses, /education or skill – this was highlighted by 27 out of the 47 as being their major area of concern.
2. Eyes Examination by fundus camera/appointment – this was highlighted in 18 out of the 47.

Table 3.81. Kuwaiti patients

Patient No	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	★	★						★	★		★	★	★	★
2							★	★	★					
3 ^A		★					★	★	★	★				★
4		★				★		★	★					
5	★	★						★	★	★				
6 ^B	★	★						★	★					
7 ^C							★	★	★					★
8								★	★					★
9 ^D	★	★					★	★	★	★				★
10	★							★	★					
11	No comment													
12	★							★						
13 ^E		★						★		★				
14	No comment													
15		★												
16						★								
17	No comment													
18								★						
19		★	★					★						
20		★			★		★	★		★				
21								★	★					
22	No comment													
23 ^F		★						★	★					
24	No comment													
25	No comment													
26		★	★					★	★					
27		★												
28		★	★				★	★	★					
29		★						★		★				

30G								★						
31E		★						★			★			★
32	★		★				★	★	★					
33		★					★	★	★					
34G	No comment													
35		★						★						★
36		★					★							★
37			★	★				★						★
38E							★		★	★				★
39				★			★		★					★
40			★					★	★					
41		★							★					
42			★						★					
43		★							★	★				★
44									★	★				
45	No comment													
46G	★	★						★	★					★
47		★	★					★	★					★
48		★						★	★					★
49E							★		★					
50			★						★					
51									★					
52E		★	★						★					★
53							★		★					
54	No comment													
55		★					★		★					★
56	★		★					★	★					
57	★	★	★	★										★
58	★													
59H		★					★	★	★					★

60			★			★		★						★
61								★						
62								★			★			

Key for column headings

1= HbA1c 2=eye examination 3=Blood 4=digestive 5=pain
(S*stomach B^ body) 6 = foot

7=medication 8=lack of empathy 9=treatment 10 = patient knowledge 11
renal problems

12= procedure transfer patient to the hospital 13 = pharmacist input 14 =
private physicians and KOC

From this complex table two major areas of concern were found for non-Kuwaiti patients.

1. Lack of empathy (Dr/Nurses, /education or skill – this was highlighted by 47 out of the 62 as being their major area of concern.
2. Eyes Examination by fundus camera/appointment – this was highlighted in 28 out of the 62.

For the sake of comprehensiveness and clarity the tables above could not include some of the data the patients provided. Consequently, the additional comments they made are marked with a *letter* next to each patient number in the table above. An explanation of each of these letters now follows.

Patient number 3 (3A). commented upon the changes in relation to the diabetic physician. For example, in Ramadan there is only one physician for all the patients in the clinic.

Patient number 6 (6B). commented upon the ketones in urine. When the colour of her urine changed and she didn't know if that was normal or dangerous. Gyms are very expensive in Kuwait.

Patient number 7 (7C). commented upon the Physician prescribing hypolipidemic drugs medication for no reason. The other comment mentioned by this patient was that the physician prescribed medication which caused an allergy such as (Exforge)

Patient number 9 (9D). mentioned a concern about inflammation in their gums patient and interestingly, **patient 13** had the same problem. The patient took herbs (Costus) to treat diabetes and **patient 56** took the same herb to treat his diabetes. The patient asked the physician to prescribe for him vitamin B complex and physician also prescribed hypolipidemic drug without a reason.

Patients number 13,31,38,49,52 (13,31,38,49,52E), they did not transfer to dietitian.

Patient number 23(23F), His mother and father and uncles are all diabetic type 2 and his cousins all are diabetic too. One of his cousins is diabetic and he got his foot cut and he had kidney failure and he was blind after that he died, his mother got blind specialist she always had an headache and she told the diabetic physician he only gave her Panadol then she went to an eye doctor and he told her she came late and she got blind. The eye specialist said if she had come earlier she would not been blind.

Patients numbers: 30, 34, 46 (30, 34, 46G), suffered from hypertension before diabetes.

Patient number 59(59H), in her big toe then it ‘falls off’ she went to the UK for treatment and she used morrha to treat the infections in her legs. The doctor in the UK suggested the morrha because it dries the wound and prevents gangrene. She has been using the morrha for 7 years.

Table 3.80 shows that only 38 from 47 (80%) non Kuwaiti patients give their comments, whereas in Table 4.78 reveal that only 53 from 62 (83%) from the Kuwaiti patients gave their comments

According to patient comments, the major areas for concern are shown below in italics.

- *The first area for concern of 47 Kuwaiti patients and 27 non Kuwaiti was that the majority of the clinical workers did not have sufficiently developed skills or empathy. Doctors and Nurse were commonly accused of not providing sufficient attention to patient problems,*
- *The second area for concern in 28 Kuwaiti patients and 18 non Kuwaiti was that the diabetic physicians in the diabetic clinics did not know how to check the eye with the fundus camera, and were not transferred to an ophthalmologist and was not checked by the diabetic physicians. In another patient he had bleeding in his eye and for this reason he went to private hospital. Another mentioned that he had a problem in his eyes and he could*

not see and the diabetic physician prescribed for him an eye drop but did not refer him to an ophthalmologist. The patient himself was so concerned that he had not been told what the eye drops were for that he went to a private ophthalmologist and after diagnosis the ophthalmologist mentioned he had retinal problem due to diabetes.

- *The third area of concern for 20 Kuwaiti patients and 5 non-Kuwaiti diabetic patients was that the effectiveness of their treatment as they considered it was either inadequate in terms of meeting patient desires, or even inadequate in terms of healthcare standards and principles.*
- *The fourth area for concern of 20 Kuwaiti and 3 non Kuwaiti diabetic patients was that the private hospitals physicians were stated to care more about the patients and for this reason some of them went to the MOH diabetic clinic just to takes their medication and then went to the KOC (Kuwait Oil Company) clinic or private hospitals to check with a diabetic physician due to the carelessness from the physician in the MOH clinic. One patient who had heart problems and another patient who had eye bleeding were diagnosed by the private hospitals, not the MOH diabetic clinic or hospital. In fact, one patient mentioned that the private hospitals were bad because they prescribed medications according the requirement of the patients, but the private hospital physicians are much better than the ones in the Ministry of Health because they listen to the patients' problems.*
- *The fifth area of concern of 11 Kuwaiti and 8 non Kuwaiti patients mentioned that the diabetic physicians just give the patients medications without telling them the reasons for it. For example one non Kuwaiti mentioned she did not know that she had a high cholesterol until the pharmacist mentioned to her the use of the drug she had been prescribed. Others Kuwaiti and non-Kuwaiti patients mentioned that diabetic physicians repeat the same medication even if it wasn't good for the patient. In one non Kuwaiti patient lisinopril caused both breathing difficulties and cough and when she spoke with her physician about this side effect he told her there is alternative medicine but it is only prescribed for Kuwaiti patients. Another patient mentioned she is very weak and the diabetic physician prescribed for her vitamin D, without even checking if she had a deficiency or not. She said there is no care from the physician about the patients' health medication may even be unsuitable for*

administration such as the medications which they got from a company in the Emirates. Another example one Kuwaiti patient mentioned that the KOC clinic prescribed (Exforge) and blood pressure medication caused an allergy to him. In some patients they commented that even when medications were prescribed the choice was very limited and in some cases did not actually work because that is all that was available.

- The sixth area for concern of 11 Kuwaiti and 5 non Kuwaiti patients that the diabetic physicians did not measure the levels of HbA_{1c}, the HbA_{1c} is not done without the requirement of the patient and only some of Kuwait and non-Kuwaiti patients mentioned that the last time a blood test to check the HbA_{1c} was done some time ago. Also 13 Kuwaiti and 8 non Kuwaiti mentioned for the question about 'blood analysis' that no blood analysis was done. One of them mentioned that the last blood analysis had been done was more than 5 years ago to check if there was any diabetic complications
- The seventh area of concern of 5 Kuwaiti and 10 non Kuwaiti patients severe from either pain in there stomach and 'toughness' digesting the food or constipation .
- The eighth area of concern of 3 Kuwaiti and 2 non Kuwaiti was that one Kuwaiti mentioned that the nephrologist didn't mention for him that he had kidney failure the nephrologists mentioned for him that both his kidneys work 50% he didn't feel well and travelled to Jordan and they mentioned for him he had kidney failure. Another Kuwaiti patient mentioned that she feel drowsiness and the diabetic physician didn't know what was wrong with her she went to the hospital and they told her she had kidney disease. A third patient mentioned that he has a small stone in his kidney. Another non Kuwaiti mentioned that his blood pressure was not stable and he went to the diabetic physician and he didn't know the reason. After that he went to the hospital they made some blood tests and they told him he had problems in the kidney. The patient was surprised that the diabetic physician didn't send him to a kidney specialist, before he checked his file and he told him he had protein in the kidney and the patient didn't know if that was dangerous or not.

There are various concerns with a few patients. These will be discussed separately for Kuwaiti and Non Kuwaiti patients below.

For non-Kuwaiti Patients

- *One patient mentioned she has severe body pain and she is always 'in stress'.*

For Kuwaiti Patients

- *One patient mentioned that the reason for cutting her foot is because of the carelessness of the diabetic doctor -she felt burning and numbness in the foot but the doctor did not check her foot and she did not know the reasons and she always goes to the doctor and he continues writing the a medication only with no checkups. In Kuwait they were going to cut off the whole leg so she went to Thailand and got treated and they said that there is no need to cut off the whole leg.*

The area related to diabetic patient *knowledge* was that only 7 Kuwaiti patients give comments about their Knowledge as to how they treat their disease. One lady mentioned that she took medicines without asking her physician, such as pain killers for headache and foot pain example (Ponstan, Norgesic). Sometimes she does not take care of her food 'routine' as she eats everything even dessert, Secondly, she mentioned she checked her blood glucose every day only when she felt unwell. Another patient mentioned took some herbs, Costus, barley for their disease

Summary of the key findings:

1. The BMI values \pm S.D. were calculated and compared for the Kuwaiti group, using the paired Student's t test, they were $33.3 \text{ kg/m}^2 \pm 6.7 \text{ kg/m}^2$ at first diagnosis and at the time of the study were $31.6 \text{ kg/m}^2 \pm 5.6$. The highly significant difference which was found ($p < 0.01$) provides strong evidence against the null hypothesis. For the other group (i.e. Non- Kuwaiti) the BMI values were not significant different ($p > 0.05$), $31.1 \text{ kg/m}^2 \pm 5.2 \text{ kg/m}^2$ at first diagnosis and at the time of the study were $30.3 \text{ kg/m}^2 \pm 5.1$.
2. The majority of patients received for their first line treatment 'tablet medication'. In contrast, 14.9% of the male respondents received insulin as their first line treatment and 8.5% tablets and exercise, respectively. Whereas, for females, 4.8% received insulin and 1.6% tablets and exercise. Most interestingly 19.7% of the respondents (i.e. 14.9% male and 4.8% female), their first recommendation was to use insulin.
3. On analysis there was no association between nationality and controlling diabetes using insulin according to sex, since p-values were 0.245 and 0.871 for Kuwaiti and Non-Kuwaiti respectively.
4. On analysis, 55.3% of Kuwaiti females had never had their blood sugar level measured in the past month, while for male Kuwaitis it was 45.8%. For non-Kuwaiti females, 54.2% and 56.5% of the males had never had their blood sugar level examined in the past month.
5. Using the Chi-Square Test we can conclude that there is no association between nationalities and number of times of blood examination for blood sugar level in the past month, attributed to sex, since the p-values were 0.814 and 0.678.
6. The feet of only 13.2% of Kuwaiti females and 8.3% of males were examined by a primary care doctor. Among non-Kuwaitis 13.0% of males and 0% of females had had their feet examined.
7. Patients did not know the number of calories that they should consume on a daily basis to maintain a healthy and optimal body weight as only 4.2% and 2.6% of

Kuwaiti males and females had been placed on a weight management program from a hospital dietitian. For non-Kuwaiti males and females 0% were on weight management program from a hospital dietitian.

8. 37.5% and 28.9% of Kuwaiti males and females undertook walking for 10-30 minutes every day, while 43.5% and 25% of non-Kuwaiti males and females were walking for 10-30 minutes every day. In addition, 37.5% and 39.5% of Kuwaiti males and females were walking twice or 3 times a week for 10-30 minutes, while 39.1% and 45.8% of non-Kuwaiti males and females were walking twice or 3 times a week for 10-30 minutes. The Chi-Square Test found no association between nationalities and types of exercise followed by the study members attributed to sex, since the p-values were 0.631 and 0.382.

9. An **awareness value** when calculated as follows: If a patient was aware of 5 or more of the complications this indicates a "high awareness", 3 to 4 complications meant the patient had a "medium awareness" and 2 or less they had a "low awareness" found that only 8.3% of Kuwaiti males had a high awareness of diabetes complications, 50.0% of Kuwaiti females a medium awareness. For non-Kuwaitis only 4.3% of the males had a high awareness, and 41.7% of non-Kuwaiti females had a medium awareness. Using the Chi-Square Test there was no association between nationality and awareness of diabetes complications attributed to sex among the two groups (Kuwaiti and non-Kuwaiti) since p-values were 0.184 and 0.567 respectively

10. The percentage of patients knowing they had kidney problems for the Kuwaiti group was 12.5% and 13.2% of males and females whereas for the non-Kuwaitis it was 21.7% and 16.7% for males and females respectively. Using the Chi-Square Test the result indicated that there is no association between nationality and knowing having kidney problem attributed to sex; since p-values were 0.721 and 0.904.

11. Only three Kuwaiti patients, one male two female and only one non-Kuwaiti patient reported that they require dialysis.

12. Only 2 Kuwaitis had received a kidney transplant, one male and one female.

13. 50% of Kuwaiti males and 60.9% of non-Kuwaiti males had hypertension, while 81.6% of Kuwaiti females and 62.5% of non-Kuwaiti females had hypertension.

14. No association between nationality and having hypertension attributed to sex since p-values were 0.490 and 0.260.

15. Within the study patient groups who had hypertension, 99% of these patients reported that they were taking medication due to hypertension and a further one although hypertensive was not taking any medication.

16. 66.7% of Kuwaiti males 71.1% of Kuwaiti females had their retinas examined. For non-Kuwaitis the figures were: 56.5% of the males and 41.7% of the females. The Chi-Square Test indicated there was no association between nationality and examination of the retina attributed to sex since p-values were 0.715 and 0.308.

17. 31.2% of Kuwaiti males indicated that the physician who conducted their eye examination was a primary care doctor, while 68.8% indicated that their eye had been examined by an eye specialist. 46.2% of non-Kuwaiti males indicate that physician who conducted the eye examination was a primary care doctor , while 53.8% indicated an eye specialist. Moreover, 48.1% of Kuwaiti females and 50% non-Kuwaiti females respectively indicated that their eye examination was by a primary care doctor. The Chi-Square Test the results indicated no significant association between nationality and type of specialist who conducted the eye examination attributed to sex under 5% level of significance, since the p-values were 0.278 and 0.855.

18. The results indicate that diabetes blurred vision is a problem in 88.7% of Kuwaiti patients and 87.2% of the Non- Kuwaiti patients.

19. The results indicate that decreased in clarity of vision is a problem in 88.7% of Kuwaiti patients and 80.9% of the Non- Kuwaiti patients. The Chi-Square Test, found no significant association between nationality and diagnosed with a decreased in clarity of vision attributed to sex since the p-values were 0.288 and 0.764.

20. There was no significant association between nationality (Kuwaiti) and having a foot problem attributed to sex since p-value was 0.841, but there is a highly significance association between nationality (non-Kuwaiti) and having foot problem attributed to sex under 5% level of significance; since p-value is 0.004.

21. 35.5% of the sample who had cardiac problems were Kuwaiti, compared with 21.3% were non-Kuwaiti. The number of Kuwaiti patients who had cardiac problems was seven males and 15 females.

22. There was no significant association between nationality and heart problems attributed to sex under 5% level of significance, since the p-value were 0.409 and 0.940.

23. 62.5% of Kuwaiti males were smokers, while only 2.6% of Kuwaiti females were smokers. Among the non-Kuwaiti group, 39.1% of males were smokers, while only 8.3% of females were smokers. So men smoke more than the women in both groups.

24 Only two Kuwaiti's reported drinking alcohol and only three non- Kuwaiti reported that.

25. From the open question - the major area for concern of 47 Kuwaiti patients and 27 non Kuwaiti was that the majority of the clinical workers did not have sufficiently developed skills or empathy. Doctors and Nurse were commonly accused of not providing sufficient attention to patient problems.

Chapter 4

4. Results from 79 diabetic patients in Kuwait with kidney disease.

This chapter use as a marker in term of poor quality of care of diabetes in Kuwait which causes severe complication such as kidney disease and that could have been avoided through managing patient's condition better.

Throughout the world renal complications as a result of diabetes is well documented. The exact reasons for this progression are somewhat debatable. The study of Ueda *et al.*, (2003), suggested that insulin therapy, serum albumin, mean blood pressure and haemoglobin were independent predictors of renal failure. However a more recent by Hall (2006) has other suggestions:

“The fact that most types 1 and 2 diabetics do not develop diabetic nephropathy (DN) suggests that other factors may be involved. Genetic factors clearly play a role in the predisposition to diabetic nephropathy in family members who have DN, and linkage to specific areas on the human genome is evolving. The theory of a reduction in nephron number at birth indicates that individuals born with a reduced number of glomeruli may be predisposed to subsequent renal injury and progressive nephropathy. This has been shown in animal studies in which the mother was exposed to hyperglycemia at the time of pregnancy. If this linkage is true in humans, that would have important implications concerning the role of maternal factors in the eventual development of kidney disease”.

Some of these factors are considered in the study below.

4.1 General information from the questionnaire.

Table 4.1. Demographics of the patients, Kuwaiti and non-Kuwaiti taking part in the study.

Demographic	Categories	n	Percent
Nationality	Kuwaiti	55	70%
	Non-Kuwaiti	24	30%
	Total	79	100%
Sex	Male	41	52%
	Female	38	48%
	Total	79	100%

Nationality/Sex	Kuwaiti/Male	27	49%
	Kuwaiti/Female	28	51%
	Total	55	100%
	Non-Kuwaiti/Male	14	58%
	Non-Kuwaiti/Female	10	42%
	Total	24	100%
Current Age	30-34 Years	1	1%
	35-39 Years	4	5%
	40-44 Years	5	6%
	45-49 Years	8	10%
	50-54 Years	17	22%
	55-59 Years	6	8%
	60+ Years	38	48%
	Total	79	100%
Age at original diabetes diagnosis	Less than 20 Years	3	4%
	20-24 Years	12	15%
	25-29 Years	12	15%
	30-34 Years	15	19%
	35-39 Years	8	10%
	40-44 Years	10	13%
	45-49 Years	4	5%
	50-54 Years	5	6%
	55-59 Years	6	8%
	60+ Years	4	5%
	Total	79	100%
Height	150-159 cm	18	23%
	160-169 cm	34	43%
	170-179 cm	20	25%
	180+ cm	7	9%
	Total	79	100%

Table 4.2 shows that the mean (\pm SD) current weight was 86.2 ± 17.8 kg, , while the mean(\pm SD) of weight at first diagnosis was 85.4 kg ± 20.7 kg. We can conclude that the body weight at first diagnosis was less than the current weight, with a SD and range of weights at first diagnosis greater than their current values.

Table 4.2 .Measurements of location and dispersion for height, weight, and BMI for study sample:

Variables	Measurements		
	Mean	\pm SD	Range
Height (cm)	166.3	9.0	40
Weight (current in Kg)	86.2	17.8	102
Weight (first diagnosis in Kg)	85.4	20.7	115
BMI (current in Kg/h ²)	31.2	6.5	36.2
BMI (First Diagnosis in Kg/h ²)	30.8	7.0	39.7

Age distribution.

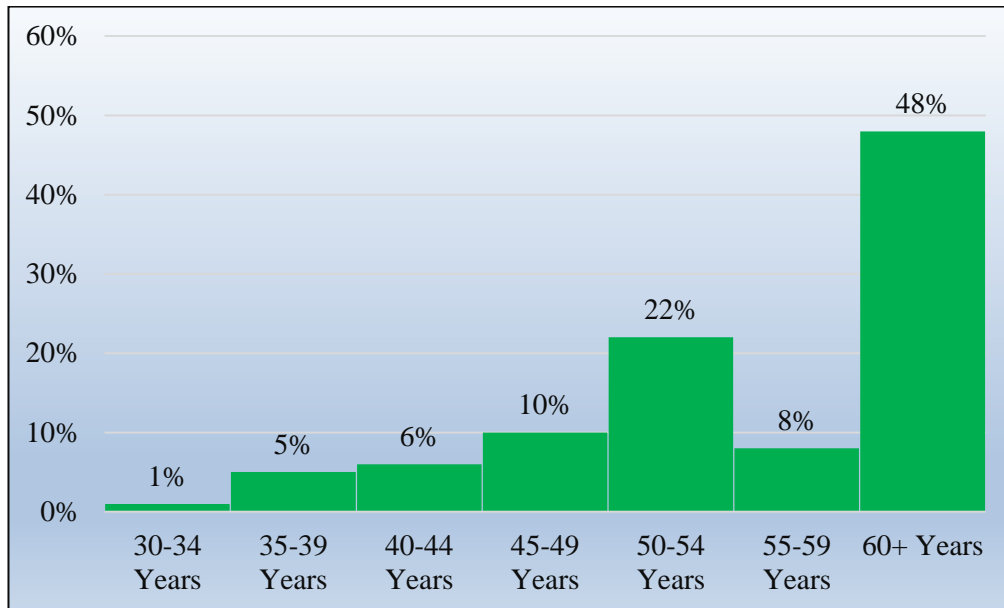


Figure 4.1. Current patient age distribution of the patients in this study.

Duration of diabetes and its treatment in the respondents

To enable a careful study of this data, the age at which they were formally diagnosed was placed into a series of five-year periods; the results are shown in Figure 4.2. The mode of 19% was found between 30-34 years. The median age being in the range 30-34 years indicates that 50% had been diagnosed before the age of 35 years.

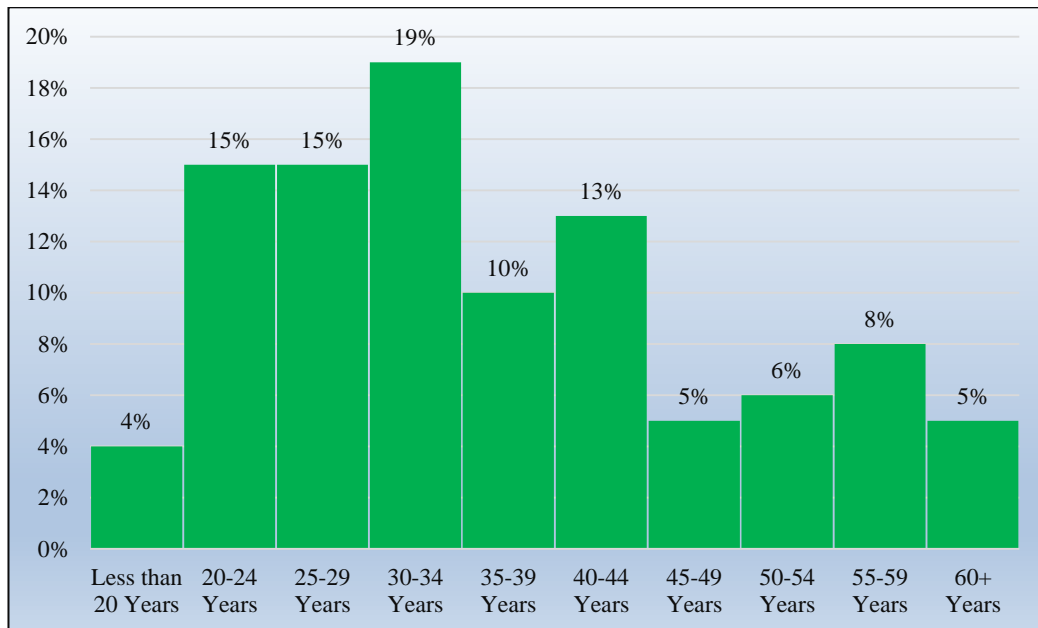


Figure 4.2. The distribution of the age ranges at which type 2 diabetes had first been diagnosed in the patients of the study group.

The data when expressed in tabular form, Table 4.3, shows that the majority of the patients who volunteered for the study were ‘established’ diabetics. The Kuwaiti patients had suffered the disease for a mean duration of 21 years and 18 years for non-Kuwaitis. When the ages were statistically compared using Student’s t test, there was no significant difference in terms of age of onset between Kuwaitis and non-Kuwaitis (p-values were 0.392 and 0.082 respectively) (Table 4.3).

Table 4.3 .Mean (\pm S.D.) of the patients current age (years) and their age at the time of original diabetes diagnosis for both Kuwaitis and non-Kuwaitis.

Nationality		Current Age (years)	Age at the time of original diabetes diagnosis (years)
Kuwaiti (n=55)	Mean \pm S.D.	55.84 \pm 11.23	34.22 \pm 12.4
Non-Kuwaiti (n=24)	Mean \pm S.D.	58.13 \pm 9.98	39.54 \pm 12.18

When the data for age of their original diagnosis and their current age according to the gender of the patients is plotted in a histogram the results are as shown in Figure 4.3.

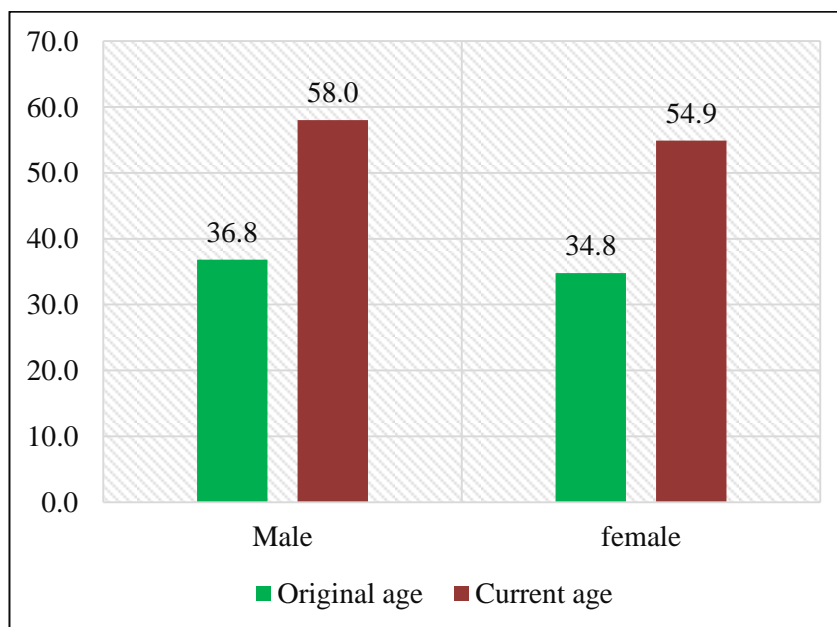


Figure 4.3. The current age of the patients in their gender groups as compared with their age at their first formal diagnosis.

Measurements of location and dispersion for height, weight, and BMI for study sample.

Height - A bar chart of body heights (cm) versus its distribution for the patients in the study group is shown in Figure 44. The mode was found to be 160-169 cm (i.e. 5.2 feet – 5.5 feet)

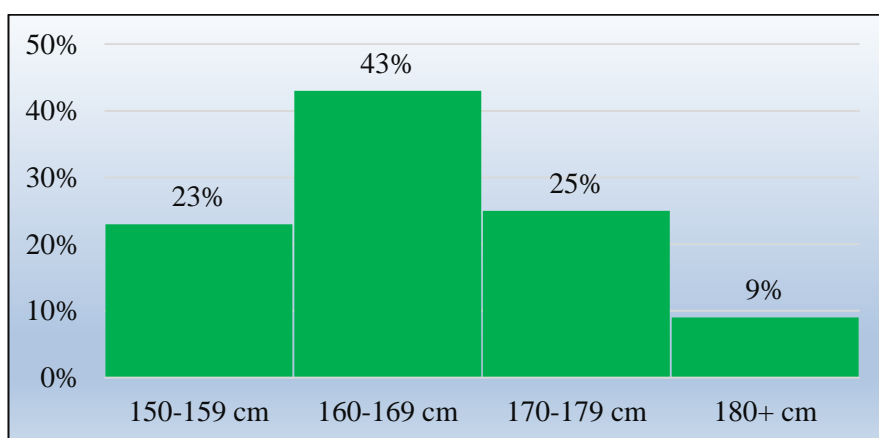


Figure 4.4. Height (cm) distribution of all the patients in the study.

Body weight

At their first diagnosis, the mean patient body weight was 85.4 kg (S.D. \pm 20.7 kg) and at the time of the study, it was 86.2 kg (S.D. \pm 17.4 kg) (Figure 4.5). Using a paired Students t test, there was no a statistical difference ($p > 0.05$) between their original weight as compared to that at the time of the study.

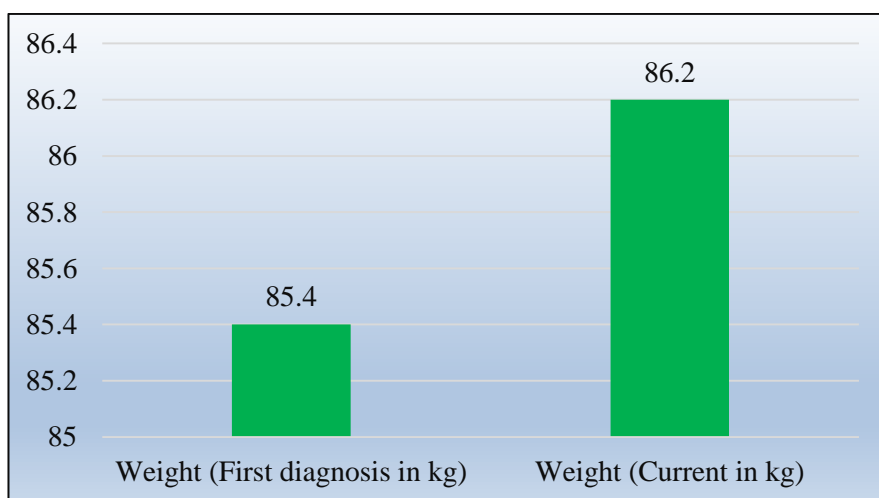


Figure 4.5. Bar chart of the mean values for the current body weight of patients [kg] (vertical axis) in the study as compared with their body weight at their first diagnosis.

Analysis of data distribution.

At this stage of the analysis it was appropriate to verify the type of distribution of data the questionnaires had generated and so a test for normality of data was carried out.

Tests of distribution normality of the data for the body weight of patients in this study.

Table 4.4 shows the results of the Kolmogorov-Smirnov and Shapiro-Wilk test statistics using SPSS for both variables-body weight at the time of the survey and body weight at first diagnosis. The results showed that the data were normally distributed, as their distribution was not significantly different ($p > 0.05$). Therefore, we can conclude that the data follows a normal distribution, and this validates the use of Student's paired t- test for these two variables in the previous and later tests.

Table 4.4 .Tests of normality of the data obtained for body weight according to nationality.

Variables	Nationality	Kolmogorov-Smirnov			Shapiro-Wilk		
		Statistic	df	p	Statistic	df	p
Body weight today	Kuwaiti	0.086	55	0.200	0.945	55	0.014
	Non-Kuwaiti	0.120	24	0.200	0.986	24	0.977
Body weight at the time of first diagnosis	Kuwaiti	0.111	55	0.090	0.957	55	0.047
	Non-Kuwaiti	0.099	24	0.200	0.976	24	0.822

Table 4.5. Paired Samples Correlations.

Paired Samples Correlations				
		n	R	p
Kuwaiti	Body weight (kg) at the time of the study and body weight (kg) at this time of first diagnosis.	55	0.53	0.000
Non-Kuwaiti	Body weight (kg) at the time of the study and body weight (kg) at this time of first diagnosis.	24	0.333	0.112

Table 4.6.Paired Samples Test

	Paired Differences			t	d.f.	p.
	Mean	S.D.	S.E.			
Kuwaiti						
Body weight (kg) at the time of the study - body weight(kg) at time of first diagnosis	3.2	18.8	2.54	1.26	54	0.212
Non-Kuwaiti						
Body weight (kg) at the time of the study - body weight(kg) at time of first diagnosis	-4.8	20.7	4.23	-1.12	23	0.273

Within the Kuwaiti group, there was a degree of correlation between the current body weight and body weight at the time of first diagnosis ($r= 0.53$ and p value = 0.000). Consequently, we can state that there has been a significant weight loss between the two time periods. In addition from Tables 4 .5 and 4.6 there is no a significant difference between these two variables, since the p -value is 0.212. Among the non-Kuwaiti Sample, there is a poor correlation between the pairs of data of body weight at the time of the study and body weight at the time of first diagnosis ($r= 0.33$ with a p -value = 0.112). In addition, from Table 4.6 there is no significant difference between these two variables, since the p -value is 0.273, therefore, we can conclude that there is no statistically difference between the two means.

Body Mass Index (BMI).

The BMI values were calculated and compared using Student's t test. For the Kuwaiti group, it was 29.9 kg/m^2 (S.D. $\pm 7.1 \text{ kg/m}^2$) at first diagnosis and at the time of the study it was 31.1 kg/m^2 (S.D. $\pm 7.0 \text{ kg/m}^2$). We have no evidence against the null hypothesis, therefore, so no significant difference was found ($p>0.05$). For the non-Kuwaiti group, the BMI values were 33.0 kg/m^2 (S.D. $\pm 6.1 \text{ kg/m}^2$) at first diagnosis and at the time of the study were 31.5 kg/m^2 (S.D. $\pm 5.2 \text{ kg/m}^2$). Although the first value in the table appears to be greater than the second, due to the numerical range no statistical significant difference was found ($p>0.05$). This use of BMI instead of body weight perhaps was therefore not a useful comparison to make.

Table 4.7. Mean (S.D.) of the BMI values at first diagnosis and after diagnosis of type 2 diabetes according to nationality (Kuwaiti & non-Kuwaiti).

Nationality		BMI-today	BMI-first diagnosis
Kuwaiti (n=55)	Mean \pm S.D.	31.1 \pm 7.0	29.9 \pm 7.1
Non-Kuwaiti (n=24)	Mean \pm S.D.	31.5 \pm 5.2	33.0 \pm 6.1

BMI and Gender.

When the BMI of the type 2 diabetes study patients was calculated for both males and females, both Kuwaiti and non-Kuwaiti the data is shown in Figure 4.6 the data being plotted in the form of a bar chart.

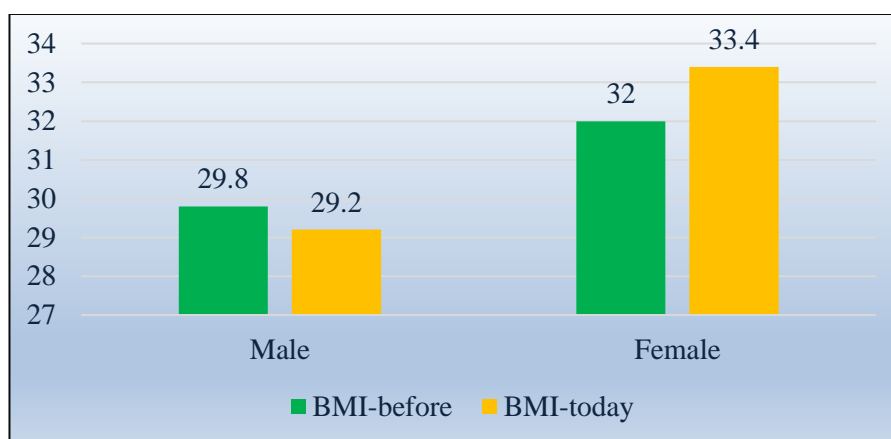


Figure 4.6. Mean Body Mass Index of male and female patients, Kuwaiti and non-Kuwaiti who took part in the study. Before= first diagnosis, today= the present value.

Table 4.8. The distribution of the current BMI of the patients who took part in the study.

Category (BMI range kg/m ²)	Frequency	Percent
Normal (20.0-24.99)	10	12.7%
Overweight (25.0-29.99)	30	38.0%
Moderately obese (30.0-34.99)	22	27.8%
Severely obese (above 35.0)	17	21.5%
Total	79	100%

From Table 4.8 the mode (38% of the patients) were overweight as their current BMI was between 25.0 - 29.99, followed by 27.8% of them who were moderately obese (i.e. the current BMI was between 30.0-34.99). Expressed as a pie chart the data is as shown in Figure 4.7.

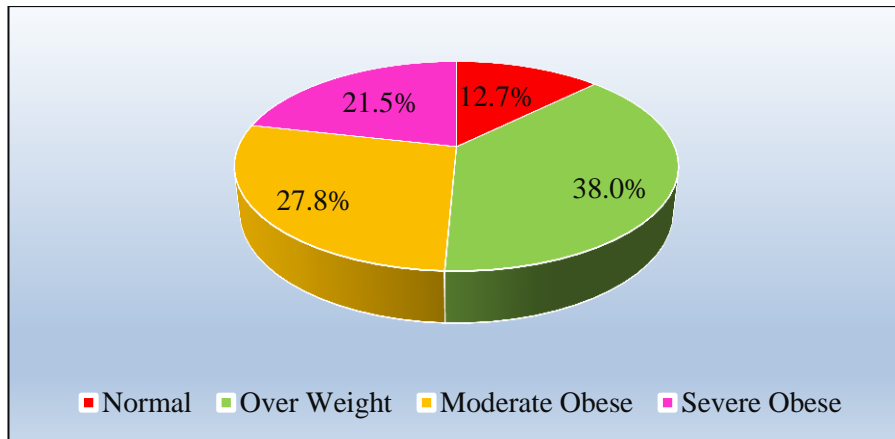


Figure 4.7. The distribution of the current BMI of the patients who took part in the study

Table 4.9 .The distribution of the prior BMI of the patients who took part in the study.

Category	Frequency	Percent
Below Normal (<20)	1	1.3%
Normal (20.0-24.99)	16	20.3%
Over weight (25.0-29.99)	23	29.1%
Moderately obese (30.0-34.99)	15	19.0%
Severely obese (above 35.0)	24	30.4%
Total	79	100%

From Table 4.9 30% of the patients were severely obese as the prior BMI was above 35.0, followed by 29.1% who were overweight as their prior BMI was between 25.0-29.99. Expressed as a pie chart the data is shown in Figure 4.8.

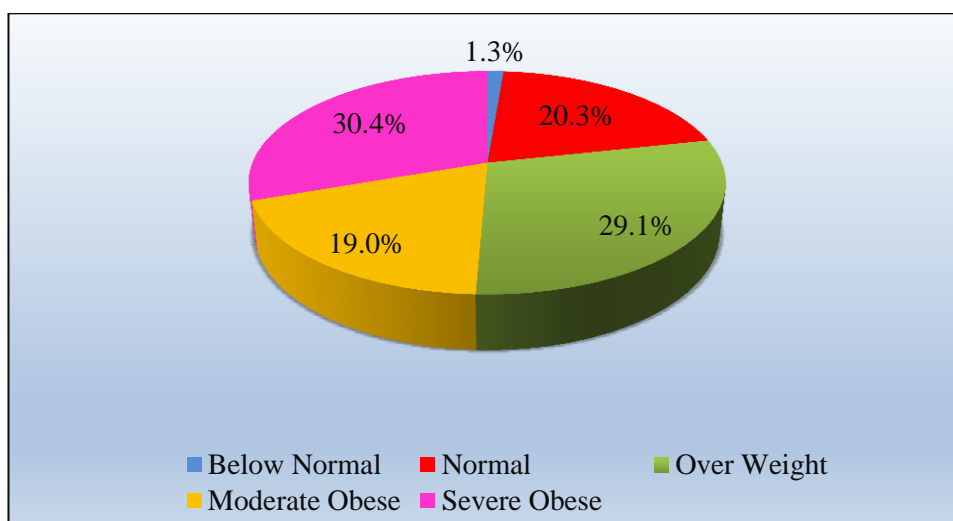


Figure 4.8. The distribution of the prior patient BMI in this study.

Table 4.10. Cross tabulation between current patient BMI and Nationality.

Nationality		Current BMI				Total
		Normal	Over Weight	Moderate Obese	Severe Obese	
Kuwaiti	n	7 (12.7%)	23 (41.8%)	14 (25.5%)	11 (20%)	55
Non-Kuwaiti	n	3 (12.5%)	7 (29.2%)	8 (33.3%)	6 (25%)	24
Total	n %	10 (12.7%)	30 (38%)	22 (27.8%)	17 (21.5%)	79 (100%)

From Table 4.10 the percentage of Kuwaiti patients who were overweight was greater than that for Non-Kuwaiti (41.8% versus 29.2%), while the percentage of Non-Kuwaiti patients who were moderately obese was greater than that for Kuwaiti (33.3% versus 25.5%). Expressed as a bar chart the same data is shown in Figure 4.9.

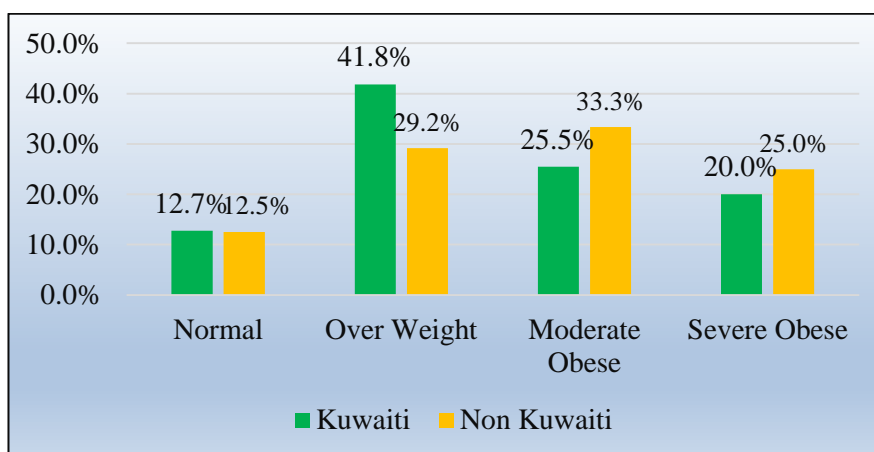


Figure 4.9. The Percentage distribution of current BMI of the patients according to body weight.

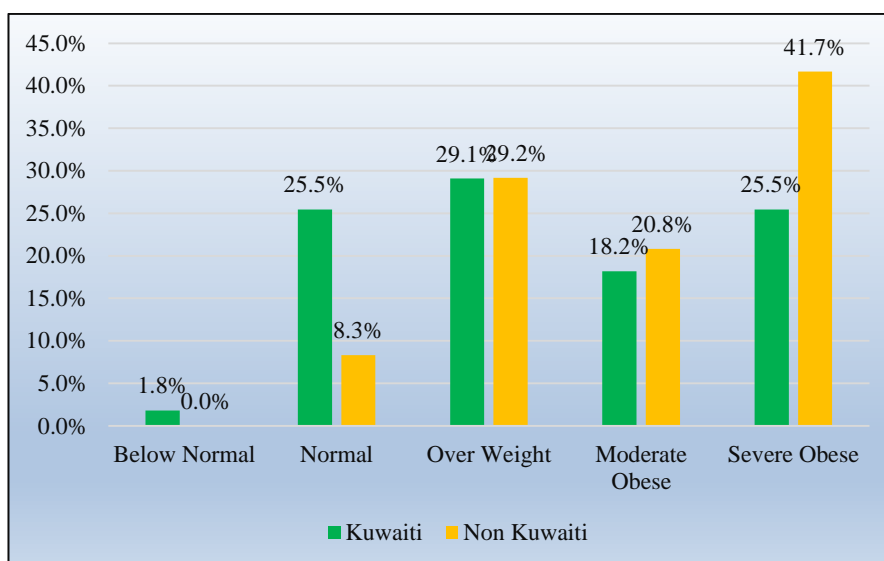


Figure 4.10. The Percentage distribution of Prior BMI of the patients according to nationality.

Figure 4.9 and 4.10 show that the percentage of Kuwaiti patients who were normal weight was so much greater than that for Non-Kuwaiti (25.5% versus 8.3%), while the percentage of Non-Kuwaiti patients who were severely obese was greater than that for Kuwaiti (41.7% versus 25.5%).

4.2 Medications used for the treatment of type 2 diabetes

Table 4.11. Cross tabulation between Nationality and controlling diabetes with tablets according to sex

Nationality/ Sex			Were you ever able to control your diabetes with tablets medication		Total
			Yes	No	
Kuwaiti	Male	n	19 (70.4%)	8 (29.6%)	27
	Female	n	19 (67.9%)	9 (32.1%)	28
	Total	n (%)	38 (69.1%)	17 (30.9%)	55 (100%)
Non Kuwaiti	Male	n	14 (100%)	0	14
	Female	n	10 (100%)	0	10
	Total	n (%)	24 (100%)	0	24 (100%)
Total	Male	n	33 (80.5%)	8 (19.5%)	41
	Female	n	29 (76.3%)	9 (23.7%)	38
	Total	n (%)	62 (78.5%)	17 (21.5%)	79 (100%)

Within the Kuwaiti group, 70.4% of males (n=19) and 67.9% females (n=19) were able to control their diabetes with tablets medication (Table 4.11). For the Non-Kuwaiti group, 100% of males (n= 14) and 100% females (n= 10) were able to control their diabetes with tablets medication. The percentage of Kuwaiti patient who were able to control their diabetes with tablets medication was less than that for Non-Kuwaiti (69.1% and 100%) respectively.

Table 4.12. Cross tabulation between Nationality and the name(s) of tablet medication that the patients took

			Nationality		Total
			Kuwaiti	Non Kuwaiti	
If yes please specify the name(s) of tablet	Glibenclamide	n	1 (33.3%)	2 (66.7%)	3
	Gliclazide	n	1 (100%)	0	1
	Glimepiride & Glibenclamide	n	0	1 (100%)	1
	Metformin	n	15 (53.6%)	13 (46.4%)	28

medication you took	Metformin & Glibenclamide	n	1 (100%)	0	1
	Metformin & Gliclazide	n	2 (40%)	3 (60%)	5
	Metformin & Sitagliptin	n	2 (100%)	0	2
	Don't know	n	16 (76.2%)	5 (23.8%)	21
Total		n(%)	38 (61.3%)	24 (38.7%)	62 (100 %)

The medications taken by Kuwaiti and non-Kuwait diabetics who attended the clinics were variable (Table 4.12). The commonest individual drug for both groups was metformin Kuwaiti (n=15) and non-Kuwaiti (n=13). Glibenclamide was used alone by Kuwaitis and non-Kuwaitis, one Kuwaiti used glibenclamide in combination with metformin (n=1), and one non-Kuwaiti used glibenclamide in combination with glimepiride (n=1).

Table 4.13. Cross tabulation between nationality, sex, and the name(s) of tablet medication that the patients took

If yes please specify the name(s) of tablet medication you took			Nationality		Total
			Kuwaiti	Non Kuwaiti	
Male	Glibenclamide	n	1 (33.3%)	2 (66.7%)	3
	Gliclazide	n	1 (100%)	0	1
	Glimepiride & Glibenclamide	n	0	1 (100%)	1
	Metformin	n	9 (56.3%)	7 (43.8%)	16
	Metformin & Glibenclamide	n	1 (100%)	0	1
	Metformin & Gliclazide	n	1 (33.3%)	2 (66.7%)	3
	Don't know	n	6 (75%)	2 (25%)	8
	Total	n (%)	19 (57.6%)	14 (42.4%)	33 (100 %)
Female	Metformin	n	6 (50%)	6 (50%)	12
	Metformin & Gliclazide	n	1 (50%)	1 (50%)	2
	Metformin & Sitagliptin	n	2 (100%)	0	2
	Don't know	n	10 (76.9%)	3 (23.1%)	13 (100%)
	Total	n (%)	19 (65.5%)	10 (34.5%)	29 (100 %)

We can see from Table 4.13, the percentage of non-Kuwaiti males who were currently taking Gliclazide and metformin was greater than that for Kuwaiti males (66.7% and 33.3% respectively). When this data was compared using Pearson Chi-Square Test there was no association between sex and the types of medications taken currently according to nationality, p-values are 0.421 and 0.280 for male and female respectively

Table 4.14. Cross tabulation between nationality and sex and length of time (days) using tablets medication.

How many years did you take it?			Sex		Total
			Male	Female	
Kuwaiti	less than 1 year	n	1 (50%)	1 (50%)	2
	1-3 years	n	1 (50%)	1 (50%)	2
	3-5 years	n	1 (100%)	0	1
	More than 5 years	n	16 (48.5%)	17 (51.5%)	33
	Total	n (%)	19 (50%)	19 (50%)	38 (100%)
Non-Kuwaiti	1-3 years	n	1 (100%)	0	1
	3-5 years	n	2 (100%)	0	2
	More than 5 years	n	11 (52.4%)	10 (47.6%)	21
	Total	n	14 (58.3%)	10 (41.7%)	24 (100%)

The majority of Kuwaiti males and females reported that they stopped taking tablet medication for their diabetes (89% and 83%) respectively, while within Non-Kuwaiti patients it is clear that 93% of males and 80 % of females indicated that they do not take the medicine now (Table 4.15).

Table 4.15. Cross tabulation between sex and currently taking tablet medication for the diabetes according to nationality.

Nationality/ Sex			Are you still taking tablet medication for your diabetes?		Total
			Yes	No	
Kuwaiti	Male	n	2 (10.5%)	17 (89.5%)	19
	Female	n	3 (16.7%)	16 (83.3%)	19
	Total	n (%)	5 (13.5%)	33 (86.5%)	38
Non-Kuwaiti	Male	n	1 (7.1%)	13 (92.9%)	14
	Female	n	2 (20%)	8 (80%)	10
	Total	n (%)	3 (12.5%)	21 (87.5%)	24 (100%)
Total	Male	n	3 (9.1%)	30 (90.9%)	33
	Female	n	5 (17.9%)	24 (82.1%)	29
	Total	n (%)	8 (13.1%)	54 (86.9%)	62 (100%)

Insulin usage in type 2 diabetes

Although patients had taken oral medications for their type 2 diabetes in the past a large number were now receiving insulin as their primary treatment for their disease. In some cases they stopped both oral and insulin medications during renal dialysis. The data is shown below and for both sexes, Kuwaiti and non-Kuwaitis tended to use insulin for different length of times.

Table 4.16. Cross tabulation between nationality, sex, and controlling diabetes-using insulin.

Nationality/Sex			Have you ever used insulin to control your diabetes?		Total
			Yes	No	
Kuwaiti	Male	n	25 (92.6%)	2 (7.4%)	27
	Female	n	25 (89.3%)	3 (10.7%)	28
	Total	n (%)	50 (90.9%)	5 (9.1%)	55 (100%)
Non-Kuwaiti	Male	n	12 (85.7%)	2 (14.3%)	14
	Female	n	8 (80%)	2 (20%)	10
	Total	n (%)	20 (83.3%)	4 (16.7%)	24 (100%)
Total	Male	n	37 (90.2%)	4 (9.8%)	41
	Female	n	33 (86.8%)	5 (13.2%)	38
	Total	n (%)	70 (88.6%)	9 (11.4%)	79 (100%)

From Table 4.16, the percentage of non-Kuwaiti females who were controlling diabetes using insulin is less than the percentage of Kuwaiti females using insulin (80% versus 89.3%). For males, 92.6% of the Kuwaiti males and 85.7% of non-Kuwaiti males were controlling their diabetes using insulin. On analysis the Chi-Square Test found no association between nationality and controlling diabetes using insulin according to sex, since the p-values are 0.245 and 0.871 for Kuwaiti and Non-Kuwaiti respectively.

Using insulin to control your diabetes.

Table 4.17. Cross tabulation between nationality and controlling diabetes-using insulin.

Nationality		Have you ever used insulin to control your diabetes?		Total
		Yes	No	
Kuwaiti	n	50 (90.9%)	5 (9.1%)	55
Non-Kuwaiti	n	20 (83.3%)	4 (16.7%)	24
Total	n (%)	70 (88.6%)	9 (11.4%)	79 (100%)

We can conclude that from Table 6.17 the percentage of Kuwaitis who have used insulin to control diabetes is greater than that for Non-Kuwaiti (90.9.8% versus 83.3%).

Table 4.18. Cross tabulation between sex and controlling diabetes using insulin

Sex		Have you ever used insulin to control your diabetes?		Total
		Yes	No	
Male	n	37(90.2%)	4(9.8%)	41
Female	n	33(86.8%)	5(13.2%)	38
Total	n (%)	70 (88.6%)	9 (11.4%)	79 (100%)

Table 4.18 shows that the percentage of males who were controlling diabetes-using Insulin is greater than that for females (90.2%, 86.8%). When this data was compared using Pearson Chi-Square test the p value was 0.643, indicating no significant correlation between sex and controlling diabetes-using insulin .

Table 4.19. Cross tabulation between Nationality and Sex and length of time (days) using Insulin

Nationality/ length of time using Insulin				Sex		Total
				Male	Female	
Kuwaiti	If yes, please write the length of time you took Insulin	< one year	n (%)	1 (50%)	1 (50%)	2 (100%)
		One year	n (%)	0	1 (100%)	1 (100%)
		2-3 years	n (%)	1 (25%)	3 (75%)	4 (100%)
		4-7 years	n (%)	6 (54.5%)	5 (45.5%)	11 (100%)
		8-10 years	n (%)	4 (50%)	4 (50%)	8 (100%)
		11-15 years	n (%)	3 (37.5%)	5 (62.5%)	8 (100%)
		> 15years	n (%)	10 (62.5%)	6 (37.5%)	16 (100%)
	Total		n (%)	25 (50%)	25 (50%)	50 (100%)
Non-Kuwaiti	If yes, please write the length of time you took Insulin	< one year	n (%)	0	1 (100%)	1 (100%)
		One year	n (%)	1 (100%)	0	1 (100%)
		4-7 years	n (%)	8 (61.5%)	5 (38.5)	13 (100%)
		8-10 years	n (%)	2 (66.7%)	1 (33.3%)	3 (100%)
		11-15 years	n (%)	0	1 (100%)	1 (100%)
		> 15years	n (%)	1 (100%)	0	1 (100%)
	Total		n (%)	12 (60%)	8 (40%)	20 (100%)

Generally, both sexes among Kuwaiti and non-Kuwaitis tended to use insulin for different length of times.

Table 4.20. Cross tabulation between Nationality and Sex and still taking insulin for diabetes

Nationality/Sex			Are you <u>still</u> taking insulin for your diabetes?		Total
			Yes	No	
Kuwaiti	Male	n	23 (92%)	2(8%)	25
	Female	n	20 (80%)	5 (20%)	25
	Total	n (%)	43 (86%)	7 (14%)	50 (100%)
Non-Kuwaiti	Male	n	11 (91.7%)	1 (8.3%)	12
	Female	n	8 (100%)	0	8
	Total	n (%)	19 (95%)	1 (5%)	20 (100%)

We can see that from Table 4.20 the percentage of Kuwaitis males who were still taking insulin for diabetes was greater than that for females (92% versus 80%). For non-Kuwaiti patients the percentage of males who were still taking insulin for diabetes was less than that for females (91.7% versus 100%) respectively.

4.3 Awareness of complications of their disease.

Weight Management

Table 4.21. Cross tabulation between nationality and sex and weight management program from a hospital dietitian.

Nationality/Sex			Please state whether you are on program from a hospital dietitian		Total
			Yes	No	
Kuwaiti	Male	n	3 (11.1%)	24 (88.9%)	27
	Female	n	1 (3.6%)	27 (96.4%)	28
	Total	n (%)	4 (7.3%)	51 (92.7%)	55 (100%)
Non-Kuwaiti	Male	n	2 (14.3%)	12 (85.7%)	14
	Female	n	0	10 (100%)	10
	Total	n (%)	2 (8.3%)	22 (91.7%)	24 (100%)

Only 11.1% and 3.6% of Kuwaiti males and females had been placed on a program from a hospital dietitian. Similarly, 14.3% of non-Kuwaiti males and 0.0% females were on program from a hospital dietitian (Table 6.21).

Examination of blood sugar.

On analysis, 7.1% of Kuwaiti females (n=2) had never examined blood sugar level in the past month, while 40.7% of Kuwaiti males (n=11) had examined their blood sugar level in the past month for roughly 2-6 times per week. 10% of non-Kuwaiti females had never examined blood sugar level in the past month (Table 4.22).

Table 4.22. Cross tabulation between nationality and sex and how often examined blood sugar level in the past month

Nationality/Sex			How often have you examined your blood sugar level in the past month?						Total
			Never	Once a week or less	Roughly 2-6 times per week	Daily	Twice a day or more	Three times or more	
Kuwaiti	Male	n	1	1	11	9	3	2	27
		%	3.7%	3.7%	40.7%	33.3%	11.1%	7.4%	100%
	Female	n	2	0	16	3	7	0	28
		%	7.1%	0.0%	57.1%	10.7%	25.0%	0.0%	100%
	Total	n	3	1	27	12	10	2	55
		%	5.5%	1.8%	49.1%	21.8%	18.2%	3.6%	100%
Non-Kuwaiti	Male	n	1	0	7	4	1	1	14
		%	7.1%	0.0%	50.0%	28.6%	7.1%	7.1%	100%
	Female	n	1	1	5	3	0	0	10
		%	10.0%	10.0%	50.0%	30.0%	0.0%	0.0%	100%
	Total	n	2	1	12	7	1	1	24
		%	8.3%	4.2%	50.0%	29.2%	4.2%	4.2%	100%

No significant difference was found between nationality and number of times of blood examination for **blood** sugar level in the past month, attributed to sex(p-values 0.115 and 0.717).

Low blood sugar levels.

Table 4.23. Cross tabulation between nationality / sex and low blood sugar.

Nationality/ Sex			Have you ever had a low blood sugar		Total
			Yes	No	
Kuwaiti	Male	n	26 (96.3%)	1 (3.7%)	27
	Female	n	28 (100%)	0	28
	Total	n (%)	54 (98.2%)	1 (1.8%)	55 (100%)
Non-Kuwaiti	Male	n	11 (78.6%)	3 (21.4%)	14
	Female	n	9 (90%)	1 (10%)	10
	Total	n (%)	20 (83.3%)	4 (16.7%)	24 (100%)

Table 4.23 shows that non-Kuwaiti females and males who had experienced low blood sugar the figures were 90% and 78.6% respectively. This contrasts with all male and female Kuwaitis as 96.3% and 100% had experienced low blood sugar. The analysis using the Pearson Chi squared test indicated that there was no association between the variables of gender and low blood sugar at the level of significance 5%, since p-values were 0.304 and 0.459.

Table 4.24. Cross tabulation between nationality / sex and high blood sugar

Nationality/ Sex			Have you <u>ever</u> had a high blood sugar?		Total
			Yes	No	
Kuwaiti	Male	n	26 (96.3%)	1 (3.7%)	27
	Female	n	27 (96.4%)	1 (3.6%)	28
	Total	n (%)	53 (96.4)	2 (3.6%)	55 (100%)
Non-Kuwaiti	Male	n	13 (92.9%)	1 (7.1%)	14
	Female	n	10 (100%)	0	10
	Total	n (%)	23 (95.8%)	1 (4.2%)	24 (100%)

Table 4.24 shows that non-Kuwaiti females and males who had experienced high blood sugar the figures were 100% and 92.9% respectively. This contrasts with all male and female Kuwaitis as 96.3% and 96.4% who had experienced high blood sugar. The analysis using the Chi squared test no association between the variables of gender and high blood sugar at the level of significance 5%, since the p-values were 0.979 and 0.388.

Urinary tests – Table 4.25 shows that 14.8% of Kuwaiti males did not test their urine for ketones, and 81.5% of them did not know what ketones actually were, while 0.0% of Kuwaiti females tested urine for ketones, and 89.3% of them did not know what ketones were. Within non-Kuwaiti patients, 14.3% of males tested for urine for ketones and 71.4% of them did not know what ketones were. Additionally, 90% of the non-Kuwaiti females did not know what ketones were.

Table 4.25. Cross tabulation between Nationality and Sex and test for urinary ketones

Nationality/ Sex			Do you test for urine for ketones			Total
			Yes	No	Don't know what ketones are	
Kuwaiti	Male	n	1 (3.7%)	4 (14.8%)	22 (81.5%)	27
	Female	n	0	3 (10.7%)	25 (89.3%)	28
	Total	n (%)	1 (1.8%)	7 (12.7%)	47 (85.5%)	55 (100%)
Non-Kuwaiti	Male	n	2 (14.3%)	2 (14.3%)	10 (71.4%)	14
	Female	n	1 (10%)	0	9 (90%)	10
	Total	n (%)	3 (12.5%)	2 (8.3%)	19 (79.2%)	24 (100%)

When this data was compared, using the Chi-Square Test there was no association between nationality and making test for urine for ketones according to sex; since the p-values were 0.518 and 0.413.

Ketoacidosis - This problem was found to occur very rarely (Table 4.26)

Table 4.26. Cross tabulation between Nationality and Sex and having ketoacidosis

Nationality/Sex			If Yes, please indicate how often you have been in ketoacidosis			Total
			1-2 times a year	2-3 times a year	3-4 times a year	
Kuwaiti	Male	n (%)	0	0	1(100%)	1
Non-Kuwaiti	Male	n	0	1 (50%)	1 (50%)	2
	Female	n	1 (100%)	0	0	1
	Total	N (%)	1 (33.3%)	1 (33.3%)	1 (33.3%)	3 (100%)

Table 4.26 shows that one Kuwaiti male had ketoacidosis 3-4 times a year, while three of none Kuwaiti males and females had ketoacidosis for different times a year.

Hypertension.

Table 4.27. Cross tabulation between nationality and sex and having high blood pressure

Nationality/ Sex			Do you have high blood pressure?		Total
			Yes	No	
Kuwaiti	Male	n	24 (88.9%)	3 (11.1%)	27
	Female	n	24 (85.7%)	4 (14.3%)	28
	Total	n (%)	48 (87.3)	7 (12.7%)	55 (100%)
Non-Kuwaiti	Male	n	13 (92.9%)	1 (7.1%)	14
	Female	n	9 (90%)	1 (10%)	10
	Total	n (%)	22 (91.7%)	2 (8.3%)	24 (100%)

Table 4.27 shows that 87.3% of Kuwaitis and 91.7% of non-Kuwaiti had high blood pressure. Moreover, the percentage of male among the two groups who had high blood pressure was greater than the percentage of female among the two groups who had this problem.

Table 4.28. Cross tabulation between sex, nationality and if so, do you take medication for this reason

Nationality/ Sex			And if so, do you take medication for this reason		Total
			Yes	No	
Kuwaiti	Male	n	23 (95.8%)	1 (4.2%)	24
	Female	n	24 (100%)	0	24
	Total	n (%)	47 (97.9%)	1 (2.1%)	48 (100%)
Non Kuwaiti	Male	n	13 (100%)	0	13
	Female	n	8 (88.9%)	1 (11.1%)	9
	Total	n (%)	21 (95.5%)	1 (4.5%)	22 (100%)
Total	Male	n	36 (97.3%)	1 (2.7%)	37
	Female	n	32 (97.0%)	1 (3%)	33
	Total	n (%)	68 (97.1%)	2 (2.9%)	70 (100%)

Within the study group 97.1% of patients reported that they were taking medication due to high blood pressure and a further two, although hypertensive, were not taking any medication.

When asked to provide the names of their medication, 51.5% of the sample members reported that they took: amlodipine (7.4%), atenolol (2.9%), atenolol & lisinopril (1.5%), captopril (1.5%), Concor (4.4%), Concor Andzestoretic (1.5%), hydralazine (4.4%), lisinopril (10.3%), nifedipine (7.3%), nifedipine & Concor & hydralazine, hydralazine (1.5%), valsartan (4.4%), verapamil (1.5%), verapamil & hydralazine (1.5%), while the 48.5% of them reported that they did not remember the medication that they took.

Table 4.29. Cross tabulation between sex, nationality and how often you check your blood pressure.

Nationality/ Sex			How often is your blood pressure checked				Total
			Daily	Weekly	Monthly	Annually	
Kuwaiti	Male	n	6	13	4	1	24
		%	25.0%	54.2%	16.7%	4.2%	100%
	Female	n	4	16	4	1	25
		%	16.0%	64.0%	16.0%	4.0%	100%
	Total		10	29	8	2	49
Non -Kuwaiti	Male						
		%	20.4%	59.2%	16.3%	4.1%	100%
	Female	n	0	7	1	1	9

		%	0.0%	77.8%	11.1%	11.1%	100%
	Total	n	5	12	3	2	22
		%	22.7%	54.5%	13.6%	9.1%	100%

From the table 4.29, it is clear that 54.2% and 64.0% of Kuwaiti males and females indicated that they checked blood pressure weekly. For the non-Kuwaiti patients, 38.5% of males and 77.8% of females checked their blood pressure weekly. In general, 20.4% of Kuwaiti patients, versus 22.7% of non-Kuwaiti checked their blood pressure daily.

Eye - Table 4.30. Cross tabulation between nationality and sex and examined the retina

Nationality/ Sex			Have you ever had the back of your eyes (the retina) examined? (not including examination by an option or optometrist just for glasses)		Total
			Yes	No	
Kuwaiti	Male	n	26 (96.3%)	1(3.7%)	27
	Female	n	24 (85.7%)	4 (14.3%)	28
	Total	n (%)	50 (90.9%)	5 (9.1%)	55 (100%)
Non-Kuwaiti	Male	n	13 (92.9%)	1(7.1%)	14
	Female	n	10 (100%)	0	10
	Total	n (%)	23 (95.8%)	1 (4.2%)	24 (100%)
Total	Male	n	39 (95.1%)	2 (4.9%)	41
	Female	n	34 (89.5%)	4 (10.5%)	38
	Total	n (%)	73 (92.4%)	6 (7.6%)	79 (100%)

Table 4.30 shows that 96.3% of Kuwaiti males 85.7% of Kuwaiti females had their retinas examined, while for non-Kuwaitis the figures were 92.9% for males and 100% for females respectively. When this data was compared using chi-square test there was no association between nationality and examination of the retina attributed to sex at the 5% level of significance, since the p-values were 0.172 and 0.388.

Table 4.31. Cross tabulation between Nationality and Sex and type of specialist who conducted the eye examination

Nationality/ Sex			If yes who conducted the eye examination		Total
			A diabetes specialist	An eye specialist	
Kuwaiti	Male	n	1 (3.8%)	25 (96.2%)	26
	Female	n	0	24 (100%)	24
	Total	n (%)	1 (2%)	49 (98%)	50 (100%)
Non-Kuwaiti	Male	n	0	13 (100%)	13
	Female	n	1(10%)	9 (90%)	10
	Total	n (%)	1 (4.3%)	22 (95.7%)	23 (100%)
Total	Male	n	1 (2.6%)	38 (97.4%)	39
	Female	n	1(2.9%)	33 (97.1%)	34
	Total	n (%)	2 (2.7%)	71 (73.3%)	73 (100%)

From Table 4.31 we can see only 3.8% of Kuwaiti males indicated that the specialist who conducted their eye examination was a diabetes specialist, while 96.2% indicated that the specialist who conducted their eye examination was a non-diabetes eye specialist. Additionally, 100% of non-Kuwaiti males (n=13) indicate that specialist who conducted the eye examination was a non-diabetes eye specialist. Moreover, none of Kuwaiti females and 10.0% of non-Kuwaiti females respectively indicate that the specialist who conducted the eye examination for them was a diabetes specialist.

When this data was compared using Pearson chi-square test the results showed no significant association between nationality and the type of specialist who conducted the eye examination attributed to sex under 5% level of significance, since the p-values were 0.332 and 0.244.

Table 4.32. Cross tabulation between sex, nationality and * Have you had laser treatment for your eyes?

Nationality/ Sex			Have you had laser treatment for your eyes?		Total
			Yes	No	
Kuwaiti	Male	n	21 (77.8%)	6 (22.2%)	27
	Female	n	19 (67.9%)	9 (32.1%)	28
	Total	n (%)	40 (72.7)	15 (27.3)	55 (100%)
Non-Kuwaiti	Male	n	10 (71.4%)	4 (28.6%)	14
	Female	n	6 (60%)	4 (40%)	10
	Total	n (%)	16 (66.7%)	8 (33.3%)	24 (100%)
Total	Male	n	31(75.6%)	10 (24.4%)	41
	Female	n	25 (65.8%)	13 (34.2%)	38
	Total	n (%)	56 (70.9%)	23 (29.1%)	79 (100%)

Table 4.32 shows that 77.8% and 67.9% of Kuwaiti males and females had recieved laser treatment for their eyes, while 71.4% and 60.0% of non-Kuwaiti males and females had had laser treatment for their eyes.

Table 4.33. Cross tabulation between sex, nationality and have you ever had a foot problem?

Nationality/ Sex			Have you ever had a foot problem?		Total
			Yes	No	
Kuwaiti	Male	n	23 (85.2%)	4 (14.8%)	27
	Female	n	23 (82.1%)	5 (17.9%)	28
	Total	n (%)	46 (83.6%)	9 (16.4%)	55 (100%)
Non-Kuwaiti	Male	n	12 (85.7%)	2(14.3%)	14
	Female	n	9 (90%)	1 (10%)	10
	Total	n (%)	21 (87.5%)	3 (12.5%)	24 (100%)
Total	Male	n	35 (85.4%)	6 (14.6%)	41
	Female	n	32 (84.2%)	6 (15.8%)	38
	Total	n (%)	67 (84.8%)	12 (15.2%)	79 (100%)

Table 4.33 shows that 85.2% and 82.1% of Kuwaiti males and females indicated that they experienced a foot problem. Among the non- Kuwaiti group, 85.7% of males and 90% of females reported that they experienced a foot problem. In addition, 26.1% of Kuwaiti males experienced numbness or tingling, and 47.8% of them experienced both numbness or tingling and burning or pain in feet, while 30.4% of Kuwaiti females suffered from burning or pain in feet. Compared to the other group, 33.3% of males suffered from numbness or tingling, while 55.6% of females suffered from both numbness or tingling and burning or pain in feet.

Table 4.34. Cross tabulation between nationality and sex and types of exercise

Nationality			Please fill in the appropriate box if you carry out any of the following type of exercise			Total
			Walking for 10-30 minutes every day	Attending a gym for a session of up to 30 minutes a week	No exercise	
Kuwaiti	Male	n	17 (63.0%)	1 (3.7%)	9 (33.3%)	27
	Female	n	6 (21.4%)	0	22 (78.6%)	28
	Total	n (%)	23 (41.8%)	1 (1.8%)	31 (56.4%)	55 (100%)
Non-Kuwaiti	Male	n	10 (71.4%)	0	4 (28.6%)	14
	Female	n	6 (60%)	0	4 (40%)	10
	Total	n (%)	16 (66.7%)	0	8 (33.3%)	24 (100%)

From Table 4.34 we can see that 63.0% and 21.4% of Kuwaiti males and females were walking for 10-30 minutes every day, while 71.4% and 60.0% of non-Kuwaiti males and females were walking for 10-30 minutes every day. In addition, 33.3% and 78.6% of Kuwaiti males and females and 28.6% and 40.0% of non- Kuwaiti males and females did not follow any exercise. Using the Chi-Square Test there was a highly significant association between sex and types of exercise followed by the study members within Kuwaiti patients ($p < 0.01$), while there was no statistical association between sex and types of exercise followed by the study members within non-Kuwaiti patients since the p-value was 0.558.

Circulation –Table 4.35 indicates that 58.2% of the sample who had cardiac problems were Kuwaiti, while 37.5% were non-Kuwaiti. For those Kuwaiti patients who had cardiac problems 18 were males and 14 female. For non-Kuwaiti ‘s there were 6 males and 3 were females. The sex difference is perhaps expected from global findings on cardiac problems.

Table 4.35. Cross tabulation between nationality and sex and suffering from heart problems.

Nationality/ Sex			Have you ever had heart problems		Total
			Yes	No	
Kuwaiti	Male	n	18 (66.7%)	9 (33.3%)	27
	Female	n	14 (50%)	14 (50%)	28
	Total	n (%)	32(58.2%)	23(41.8%)	55 (100%)
Non-Kuwaiti	Male	n	6 (42.9%)	8 (57.1%)	14
	Female	n	3 (30%)	7 (70%)	10
	Total	n (%)	9 (37.5%)	15 (62.5%)	24 (100%)

On analysis there is no significant association between nationality and heart problems attributed to sex under 5% level of significance, since the p-values were 0.210 and 0.521.

Table 4.36. Cross tabulation between nationality, sex, and if yes is it.

Nationality/ Sex			If yes, is it		Total
			Chest Pain	Heart attack	
Kuwaiti	Male	n	5 (27.8%)	13 (72.2%)	18
	Female	n	4 (28.6%)	10 (71.4%)	14
	Total	n (%)	9 (28.1%)	23 (71.9%)	32 (100%)
Non -Kuwaiti	Male	n	2 (33.3%)	4 (66.7%)	6
	Female	n	2 (66.7%)	1 (33.3%)	3
	Total	n (%)	4 (44.4%)	5 (55.6%)	9 (100%)
Total	Male	n	7 (29.2%)	17 (70.8%)	24

	Female	n	6 (35.3%)	11 (64.7%)	17
	Total	n (%)	13 (31.7%)	28 (68.3%)	41 (100%)

The type of cardiac problems experienced by the Kuwaiti patients was that of chest pain, (28.1%) (n=9) and 71.9% had had a heart attack (n=23)(Table 4.36). Among non-Kuwaiti the proportions were (44.4%) and (55.6%) respectively. Generally, the proportion of the patients who had chest pain was 31.7% while 68.3% had a heart attack.

Kidney - Table 4.37. Cross tabulation between sex, nationality * Have you ever been told by the diabetic physician you have kidney disease? * Cross tabulation

Nationality/ Sex			Have you ever been told by the diabetic physician you have kidney disease?		Total
			Yes	No	
Kuwaiti	Male	n	11 (40.7%)	16 (59.3%)	27
	Female	n	7 (25%)	21 (75%)	28
	Total	n (%)	18 (32.7%)	37 (67.3%)	55 (100%)
Non- Kuwaiti	Male	n	2 (14.3%)	12 (85.7%)	14
	Female	n	2 (20%)	8 (80%)	10
	Total	n (%)	4 (16.7%)	20 (83.3%)	24 (100%)
Total	Male	n	13 (31.7%)	28 (68.3%)	41
	Female	n	9 (23.7%)	29 (76.3%)	38
	Total	n (%)	22 (27.8%)	57 (72.2%)	79 (100%)

From Table 4.37, 40.7% of Kuwaiti patients who had been told by the diabetic physician that they had kidney disease were males (n=11), with 25% were females (n=7). Among the non- Kuwaiti patients we can see that 14.3% of them were males (n=2) indicated that they had been told by the diabetic physician that they had kidney disease, while 20% of them were females (n=2).

Table 4.38. Cross tabulation between nationality and sex and proteinuria.

Nationality/Sex			Have you been diagnosed by diabetic clinic as having protein in your urine?			Total
			Yes	No	I don't know	
Kuwaiti	Male	n	8 (29.6%)	15 (55.6%)	4 (14.8%)	27
	Female	n	4 (14.3%)	21(75%)	3 (10.7%)	28
	Total	n (%)	12 (21.8%)	36 (65.5%)	7 (12.7%)	55 (100%)
Non-Kuwaiti	Male	n	2 (14.3%)	12 (85.7%)	0	14
	Female	n	1(10%)	8 (80%)	1 (10%)	10
	Total	n (%)	3 (12.5%)	20 (83.3%)	1 (4.2%)	24 (100%)

Table 4.38 shows that 65.5% of Kuwaitis as compared with 83.3% of non-Kuwaitis stated they had no protein in their urine. Additionally, 12.7% of Kuwaitis and 4.2% of non-Kuwaitis stated they did not know whether they had been diagnosed as having protein in their urine or not. Finally, 21.8% of Kuwaitis and 12.5% non-Kuwaitis stated they had protein in the urine. Furthermore, 16 Kuwaiti patients (11 males and 5 females), and three non-Kuwaiti patients (two males and one female) reported that they were transferred from diabetic physician to a nephrologist. In addition, all the patients (n=79) reported that they had been told what caused their kidney disease, and this is due to diabetes.

Table 4.39. Cross tabulation between sex, nationality and what tests does the clinic carry out to diagnose that you have kidney disease on you whilst you were there?

Nationality/ Sex			What tests does the clinic carry out to diagnose that you have kidney disease on you whilst you were there?				Total
			Blood test	Nothing	I don't know	Other	
Kuwaiti	Male	n	9 (33.3%)	16 (59.3%)	1 (3.7%)	1 (3.7%)	27
	Female	n	6 (21.43%)	21 (78.57%)	0	1	28
	Total	n (%)	15 (27.3%)	37 (69.1%)	1 (1.8%)	1 (1.8%)	55 (100%)
Non-Kuwaiti	Male	n	2 (21.4%)	11 (78.6%)	0	0	13
	Female	n	1 (10%)	9 (90%)	0	1	11
	Total	n (%)	4 (16.7%)	20 (83.3%)	0	0	24 (100%)
Total	Male	n	11 (29.3%)	27 (65.9%)	1 (2.49%)	1 (2.49%)	40
	Female	n	7 (18.4%)	30 (81.6%)	0	2	39
	Total	n (%)	18 (24.1%)	57 (73.3%)	1 (1.3%)	1 (1.3%)	79

Table 4.39 shows that 27.3% of Kuwaiti patients (9 males and 6 females) indicated that they had a blood test in their clinic, to diagnose kidney disease while they were there, compared with 4 non-Kuwaiti patients (3 males and one female) respectively. In addition, 69.1% of Kuwaiti patients (n=38) and 83.3% of non-Kuwaiti patients (n=20) stated that the clinic, which they attended, did nothing for them to diagnose

kidney disease while they were there and these patients found by “accident” they had kidney disease.

Table 4.40. Cross tabulation between sex, nationality and how long has it been since you were first diagnosed with kidney disease? Circle one.

Nationality/ Sex			How long has it been since you were first diagnosed with kidney disease? (Circle one)					Total
			1 year	1-3 years	3-5 years	5-10 years	others	
Kuwaiti	Male	n	2	5	6	11	3	27
		%	7.4%	18.5%	22.2%	40.7%	11.1%	100%
	Female	n	3	9	10	5	1	28
		%	10.7%	32.1%	35.7%	17.9%	3.6%	100%
	Total	n	5	14	16	16	4	55
		%	9.1%	25.5%	29.1%	29.1%	7.3%	100%
non Kuwaiti	Male	n	3	3	2	5	1	14
		%	21.4%	21.4%	14.3%	35.7%	7.1%	100%
	Female	n	2	2	2	2	2	10
		%	20.0%	20.0%	20.0%	20.0%	20.0%	100%
	Total	n	5	5	4	7	3	24
		%	20.8%	20.8%	16.7%	29.2%	12.5%	100%
Total	Male	n	5	8	8	16	4	41
		%	12.2%	19.5%	19.5%	39.0%	9.8%	100%
	Female	n	5	11	12	7	3	38
		%	13.2%	28.9%	31.6%	18.4%	7.9%	100%
	Total	n	10	19	20	23	7	79
		%	12.7%	24.1%	25.3%	29.1%	8.9%	100%

Among the Kuwaiti patients, 29.1% of them (5 males and 9 females) indicated that the time since first diagnosis with kidney disease was 3-5 years, with more 29.1% stated that the length was 5-10 years. Compared to the non-Kuwaiti patients, the time distribution tends to be less concentrated. Interestingly, some of patients within the two groups indicated that they were first diagnosed with kidney disease 15 years previously.

Table 4.41 Cross tabulation between sex, nationality and what type of kidney disease do you have?

Nationality/sex			What type of kidney disease do you have?		Total
			Chronic	I don't know	
Kuwaiti	Male	n	23 (85.2%)	4 (14.8%)	27
	Female	n	24 (85.7%)	4 (14.3%)	28

	Total	n (%)	47 (85.5%)	8 (14.5%)	55 (100%)
Non - Kuwaiti	Male	n	11 (78.6%)	3 (21.4%)	14
	Female	n	7 (70%)	3 (30%)	10
	Total	n (%)	18 (75%)	6 (25%)	24 (100%)
Total	Male	n	34 (82.9%)	7 (17.1%)	41
	Female	n	31 (81.6%)	7 (18.4%)	38
	Total	n (%)	65 (82.3%)	14 (17.7%)	79 (100%)

Table 4.41 shows that 85.5% of Kuwaiti patients had chronic disease (23 males and 24 females), while 75% of non-Kuwaiti patients had chronic disease (11 males and 7 females). Additionally, 14.5% and 25% of Kuwaiti and non-Kuwaiti patients indicated that they didn't know what type of kidney disease they had.

Table 4.42. Cross tabulation between sex, nationality and 'Do you know what is the stage of your kidney disease?'

Nationality/ Sex			Do you know what is the stage of your kidney disease?		Total
			Yes	No	
Kuwaiti	Male	n	24 (88.9%)	3 (11.1%)	27
	Female	n	24 (85.7%)	4 (14.3%)	28
	Total	N (%)	48 (87.3%)	7 (12.7%)	55 (100%)
Non- Kuwaiti	Male	n	11 (78.6%)	3 (21.4%)	14
	Female	n	7 (70%)	3 (30%)	10
	Total	N (%)	18 (75%)	6 (25%)	24 (100%)
Total	Male	n	35 (85.4%)	6 (14.6%)	41
	Female	n	31 (81.6%)	7 (18.4%)	38
	Total	N (%)	66 (83.5%)	13 (16.5%)	79 (100%)

Among the Kuwaiti patients, 87.3% of them (24 males and 24 females) indicated that they knew what is the stage of their kidney disease, compared to 75% of non-Kuwaiti patients. The proportions of Kuwaiti and non-Kuwaiti patients who did not know what the stage of their kidney disease were 12.7% and 25% respectively. It is worth mentioning here, the stage of kidney disease which the patients were left was the stage 5-kidney failure. The chi-squared test indicated no association between nationality and knowledge of the disease's stage attributed to sex, since p values were 0.724 & 0.633 respectively (Table 4.42).

Also from this table, the patients indicated that they had several symptoms due to kidney disease namely: swelling, skin rash/itching, coma, nausea and vomiting, shortness of breath, fatigue, alone or with combinations with each other.

Table 4.43. Cross tabulation between sex, nationality and does kidney disease affect your daily life?

Nationality/ Sex			Does kidney disease affect your daily life?		Total
			Yes	No	
Kuwaiti	Male	n	26 (96.3%)	1 (3.7%)	27
	Female	n	26 (92.9%)	2 (7.1%)	28
	Total	n (%)	52 (94.5%)	3 (5.5%)	55 (100%)
Non- Kuwaiti	Male	n	13 (92.9%)	1 (7.1%)	14
	Female	n	9 (90%)	1 (10%)	10
	Total	n (%)	22 (91.7%)	2 (8.3%)	24 (100%)
Total	Male	n	39 (95.1%)	2 (4.9%)	41
	Female	n	35 (92.1%)	3 (7.9%)	38
	Total	n (%)	74 (93.7%)	5 (6.3%)	79 (100%)

For Kuwaiti patients, 94.5% of them (26 males and 26 females) indicated that kidney disease affected their daily life as compared to 91.7% of non-Kuwaiti patients (13 males and 9 females). The kidney disease affected the diet exercised by patients (12.2%), and affected their work (14.9%), their social life (9.5%), and (63.5%) for these effects together. The chi-squared test indicated that there was no association between the nationality and the knowledge of the disease's stage attributed to sex, since p-values were 0.574, 0.803 respectively.

Table 4.44. Cross tabulation between sex, nationality and a family history of kidney disease?

Nationality/ Sex			Do you have a family history of kidney disease?		Total
			Yes	No	
Kuwaiti	Male	n	10 (37%)	17 (63%)	27
	Female	n	5 (17.9%)	23 (82.1%)	28
	Total	n (%)	15 (27.3%)	40 (72.7%)	55 (100%)
Non- Kuwaiti	Male	n	2 (14.3%)	12 (85.7%)	14
	Female	n	2 (20%)	8 (80%)	10
	Total	n (%)	4 (16.7%)	20 (83.3%)	24 (100%)
Total	Male	n	12 (29.3%)	29 (70.7%)	41
	Female	n	7 (18.4%)	31 (81.6%)	38
	Total	n (%)	19 (24.1%)	60 (75.9%)	79 (100%)

Table 4.44 shows that 27.3% and 16.7% of Kuwaiti and non-Kuwaiti patients indicated that they had a family history of kidney disease. The family member who suffered the condition were father (26.3%), mother (36.8%), brother (26.3%), father and mother and brother (5.3%), and uncle (5.3%) The chi-squared test indicated that

there was no association between the nationality and the family history of kidney disease attributed to sex, since the p-values were 0.110, 0.711 respectively.

Table 4.45. Cross tabulation between Sex, Nationality and do you know what food you should avoid if your kidneys are not behaving in a normal way?

Nationality/ Sex			Do you know what food you should avoid if your kidneys are not behaving in a normal way?		Total
			Yes	No	
Kuwaiti	Male	n	18 (66.7%)	9 (33.3%)	27
	Female	n	22 (78.6%)	6 (21.4%)	28
	Total	n (%)	40 (72.7%)	15 (27.3%)	55 (100%)
Non-Kuwaiti	Male	n	13 (92.9%)	1 (7.1%)	14
	Female	n	7 (70%)	3 (30%)	10
	Total	n (%)	20 (83.3%)	4 (16.7%)	24 (100%)
Total	Male	n	31 (75.6%)	10 (24.4%)	41
	Female	n	29 (76.3%)	9 (23.7%)	38
	Total	n (%)	60 (75.9%)	19 (24.1%)	79 (100%)

Table 4.45 shows that 72.7% and 83.3% of Kuwaiti and non-Kuwaiti patients indicated that if their kidneys were not behaving in a normal way they should avoid some foods (high knowledge). These foods were as follows: Salt (13.3%), Potassium (18.3%) all the patients whom mentioned they have avoided meals containing potassium they stopped eating banana, orange and tomatoes only but not other food like chocolate, lettuce, cucumber and nuts , and protein (1.7%). The patients whom mentioned they stopped eating protein such as meat but not others food such as egg and milk, salt & potassium & protein (20%), salt & potassium (41.7%), and the remaining proportion (5%) for different combination of these foods.

Dialysis

It was found that 64 patients out of 79 indicated that they were having renal dialysis (46 were Kuwaiti (23 males, 23 females) and 18 non-Kuwaiti (11 males, 7 females). They reported that the risks from this type of treatment were hypotension (n=13, 20.3%), anemia (n=6, 9.6%), cramps, nausea and headaches (n=3, 4.7%), infections (n=1, 1.6%), hypotension & other hypertension (n=1, 1.6%), while the remainder (n=40, 62.5%) were distributed in different groups of combinations of these types of renal dialysis. All the patients having renal dialysis (n=64) did so in a hospital.

Table 4.46. Cross tabulation between sex, nationality and how long does each dialysis take?

Nationality/ Sex			How long does each dialysis take?			Total
			1-3 hours	4-6 hours	other	
Kuwaiti	Male	n	2 (8.7%)	6 (26.1%)	15 (65.2%)	23
	Female	n	3 (13%)	7 (30.4%)	13 (56.5%)	23
	Total	n (%)	5 (10.9%)	13 (28.3%)	28 (60.9%)	46 (100%)
Non-Kuwaiti	Male	n	3 (27.3%)	2 (18.2%)	6 (54.5%)	11
	Female	n	1 (14.3%)	3 (42.9%)	3 (42.9%)	7
	Total	n (%)	4 (22.2%)	5 (27.8%)	9 (50%)	18 (100%)
Total	Male	n	5 (14.7%)	8 (23.5%)	21 (61.8%)	34
	Female	n	4 (13.3%)	10 (33.3%)	16 (53.3%)	30
	Total	n (%)	9 (14.1%)	18 (28.1%)	37 (57.8%)	64 (100%)

Table 4.46 shows that, 10.9% of Kuwaiti patients took each dialysis for 1-3 hours, and 28.3% of them took it for 4-6 hours, while the majority of them (60.9%, n=28) took each dialysis for another length of time (3.5 hours). Compared with the non-Kuwaiti patients, 22.2% of them (n= 4) indicated that they took each dialysis for 1-3 hours, and 27.8% used 4-6 hours, while 50% stated that they took each dialysis for other length of time (3.5 hours). All of the patients (n=64) stated that their dialysis schedule was three visits per week.

Kidney Transplant

Table 4.47. Cross tabulation between sex, nationality and have you had a kidney transplant?

Nationality/ Sex			Have you had a kidney transplant?		Total
			Yes	No	
Kuwaiti	Male	n	6 (22.2%)	21 (77.8%)	27
	Female	n	5 (17.9%)	23 (82.1%)	28
	Total	n (%)	11 (20%)	44 (80%)	55 (100%)
Non-Kuwaiti	Male	n	1 (7.1%)	13 (92.9%)	14
	Female	n	2 (20%)	8 (80%)	10
	Total	n (%)	3 (12.5%)	21 (87.5%)	24 (100%)
Total	Male	n	7 (17.1%)	34 (82.9%)	41
	Female	n	7 (18.4%)	31 (81.6%)	38
	Total	n (%)	14 (17.7%)	65 (82.3%)	79 (100%)

In addition, among patients who were having renal dialysis, 14 of them had a kidney transplant. They were 6 Kuwaiti males with 5 Kuwaiti females, and 3 non-Kuwaiti (1 male and 2 females). The proportion of patients who had a kidney transplant was 17.7%. The chi-squared test indicated that there was no association between the

nationality and having kidney transplant attributed to sex, since p-values were 0.686 and 0.348 respectively. From Table 4.47, 42.5% of patients who had a kidney transplant indicated that this issue started before 2011, While 42.9% of them pointed out that their kidney transplant started in 2014.

Table 4.48. Cross tabulation between Sex, Nationality and if yes is it ...?

Nationality/ Sex			If yes, is it		Total
			Living related donors like parents, children or siblings	Altruistic donor	
Kuwaiti	Male	n	4 (66.7%)	2 (33.3%)	6
	Female	n	2 (40%)	3 (60%)	5
	Total	n/%	6 (54.5%)	5 (45.5%)	11
Non- Kuwaiti	Male	n	1 (100%)	0	1
	Female	n	2 (100%)	0	2
	Total	n/%	3 (100%)	0	3
Total	Male	n	5 (71.4%)	2 (28.6%)	7
	Female	n	4 (57.1%)	3 (42.9%)	7
	Total	n /%	9 (64.3%)	5 (35.7%)	14 (100%)

The 14 patients stated that they knew what the source of the transplant kidney was. Within Kuwaiti patients, 54.5% of them (4 males and 2 females) indicated that living related donors like parents, children or siblings was the source of the transplant; while 45.5% of them pointed out that an altruistic donor was the source. All the non-Kuwaiti patients (n=3) indicated that living related donors, such as parents children or siblings was the source of the transplant kidney. Further to the Table 4.49, five Kuwaiti patients (3 males and 2 females) and two non-Kuwaiti patients (1 male and 1 female) had developed hypertension following the transplant. While two male Kuwaiti patients and two non-Kuwaiti patients (1 male and 1 female) had suffered from other types of cardiovascular disease, and only one non-Kuwaiti patient (male) had blood in the urine.

Table 4.49. Cross tabulation between Sex, Nationality and do you know what treatment(s) are currently prescribed for you?

Nationality/ Sex			Do you know what treatment(s) are currently prescribed for you?		Total
			Yes	No	
Kuwaiti	Male	n	6 (100%)	0	6
	Female	n	4 (80%)	1(20%)	5
	Total	n	10 (90.9%)	1 (9.1%)	11
Non -Kuwaiti	Male	n	1 (100%)	0	1

	Female	n	2 (100%)	0	2
	Total	n	3 (100%)	0	3
Total	Male	n	7 (100%)	0	7
	Female	n	6 (85.7%)	1(14.3%)	7
	Total	n	13	1	14
		%	92.9%	7.1%	100%

It is clear from the Table 4.49, 10 Kuwaiti patients out of 14 (6 males and 4 females) know what treatment(s) are currently prescribed for them, while 3 non- Kuwaiti patients know that. The treatment(s) were: cyclosporins (Neoral, Sandimmune, SangCya) and corticosteroids such as prednisolone (Deltasone, Orasone) (61.5%), tacrolimus (7.7%), while the remaining (30.8%) had combinations treatments.

Table 4.50. Cross tabulation between sex, nationality and are there any side effect(s) due to the medication(s)?

Nationality/ Sex			Are there any side effect(s) due to the medication(s)?		Total
			Yes	No	
Kuwaiti	Male	n	5 (83.3%)	1 (16.7%)	6
	Female	n	5 (100%)	0	5
	Total	n (%)	10 (90.9%)	1 (9.1%)	11 (100%)
Non-Kuwaiti	Male	n	1 (100%)	0	1
	Female	n	2 (100%)	0	2
	Total	n (%)	3 (100%)	0	3 (100%)
Total	Male	n	6 (85.7%)	1 (14.3%)	7
	Female	n	7 (100%)	0	7
	Total	n (%)	13 (92.9%)	1 (7.1%)	14 (100%)

Questioned about the side effect(s) due to their medication(s), 13 patients out of 14 (92.9%) (10 Kuwaiti and 3 non-Kuwaiti) reported positively. These effects included: an increase in body weight, puffiness of face, high blood sugar, elevated blood pressure, facial hair, bone disease, skin changes, acne, stomach acidity, alone or in combinations with each other.

Anemia - Table 4.51. Cross tabulation between sex, nationality and have you ever been told you were anemic?

Nationality/ Sex			Have you ever been told you were anemic?		Total
			Yes	No	
Kuwaiti	Male	n	11 (40.7%)	16 (59.3%)	27
	Female	n	25 (89.3%)	3 (10.7%)	28
	Total	n (%)	36 (65.5%)	19 (34.5%)	55 (100%)
Non-	Male	n	6 (42.9%)	8 (57.1%)	14

Kuwaiti	Female	n	9 (100%)	0	9
	Total	n (%)	15 (65.2%)	8 (34.8%)	23 (100%)
Total	Male	n	17 (41.5%)	24 (58.5%)	41
	Female	n	34 (91.9%)	3 (8.1%)	37
	Total	n (%)	51 (65.4%)	27 (26.7%)	78 (100%)

Table 4.51 shows that, 65.5% and 65.2% of Kuwaiti and non-Kuwaiti patients respectively, reported they had been told they were anemic. According to sex, the proportion of females who were told they were anemic was greater than males. The chi-squared test indicated that there was a high statistical difference between the nationality and their knowledge of the presence of anemia attributed to sex, since the p values were 0.000 and 0.005 respectively.

Table 4.52. Cross tabulation between sex, nationality how long ago were you first diagnosed with anemia.

Nationality/ Sex			If yes, how long ago were you first diagnosed?				Total
			Less than 1 year	1-3 years	3-5 years	More than 5 years	
Kuwaiti	Male	n	2	4	4	1	11
		%	18.2%	36.4%	36.4%	9.1%	100%
	Female	n	2	10	6	7	25
		%	8.0%	40.0%	24.0%	28.0%	100%
	Total	n	4	14	10	8	36
		%	11.1%	38.9%	27.8%	22.2%	100%
Non-Kuwaiti	Male	n	2	0	3	1	6
		%	33.3%	0.0%	50.0%	16.7%	100%
	Female	n	2	1	2	4	9
		%	22.2%	11.1%	22.2%	44.4%	100%
	Total	n	4	1	5	5	15
		%	26.7%	6.7%	33.3%	33.3%	100%
Total	Male	n	4	4	7	2	17
		%	23.5%	23.5%	41.2%	11.8%	100%
	Female	n	4	11	8	11	34
		%	11.8%	32.4%	23.5%	32.4%	100%
	Total	n	8	15	15	13	51
		%	15.7%	29.4%	29.4%	25.5%	100%

From the Table 4.52, 50% (n=18) and 66.6% (n=10) of Kuwaiti and non-Kuwaiti patients stated that the first diagnosis of anemia was before 3 years or more. In addition, 97.3% of Kuwaiti patients (n=36, 11 males and 24 females) indicated that they took medication to prevent anemia. The medications taken by the Kuwaiti patients were iron (94.4%), folic acid (2.8%) and 'others' (2.8%). All non-Kuwaiti patients (n= 15, 6 males and 9 females) pointed out that they took iron medication to prevent anemia.

Bone disease - Table 4.53. Cross tabulation between sex, nationality and have you ever been told you had weak bones?

Nationality/ Sex			Have you ever been told you had weak bones?		Total
			Yes	No	
Kuwaiti	Male	n	18 (66.7%)	9 (33.3%)	27
	Female	n	20 (71.4%)	8 (28.6%)	28
	Total	n(%)	38 (69.1%)	17 (30.9%)	55 (100%)
Non-Kuwaiti	Male	n	8 (57.1%)	6 (42.9%)	14
	Female	n	6 (60%)	4 (40%)	10
	Total	n (%)	14 (58.3%)	10 (41.7%)	24 (100%)
Total	Male	n	26 (63.4%)	15 (36.6%)	41
	Female	n	26 (68.4%)	12 (31.6%)	38
	Total	n (%)	52 (65.8%)	27 (34.2%)	79 (100%)

Table 4.53 shows that, 69.1% and 58.3% of Kuwaiti and non-Kuwaiti patients respectively, pointed out that they were told that they had weak bones. According to sex, the proportion of females who had been told they had weak bones was greater than males. In addition, 60.5% (n=23) and 42.9% (n=6) of Kuwaiti and non-Kuwaiti patients stated that they had weak bones since 3 years or less.

From this table, 90% of Kuwaiti patients (n=36, 17 males and 19 females) indicated that they took medication for their bones. The medications taken by the Kuwaiti patients were calcium (30.6%), vitamin D (5.6%), a combination of vitamin D and calcium (63.8%). All non-Kuwaiti patients (n= 14, 8 males and 6 females) mentioned that they took medication for their bones, namely, calcium (21.4%) and combination of vitamin D and calcium (78.6%).

Additional Tables:

Table 4.54. Sex * Body weight at this time of first diagnosis (Kg)* if yes please specify the name(s) of tablet medication you took Cross tabulation

Name(s) of tablet medication you took			Body weight at this time of first diagnosis (Kg)							Total
			> 50	50-59	60-69	70-79	80-89	90-99	100+	
Don't Know	Male	n	0	0	1	0	3	1	3	8
		%	0%	0%	13%	0%	38%	13%	38%	100%
	Female	n	0	3	1	3	0	3	4	14
		%	0%	21%	7%	21%	0%	21%	29%	100%
	Total	n	0	3	2	3	3	4	7	22
		%	0%	14%	9%	14%	14%	18%	32%	100%
Glibenclamide	Male	n	0	0	1	1	0	0	1	3

	Total	%	0%	0%	33%	33%	0%	0%	33%	100%
		n	0	0	1	1	0	0	1	3
		%	0%	0%	33%	33%	0%	0%	33%	100%
Gliclazide	Male	n	0	0	0	1	0	0	0	1
		%	0%	0%	0%	100%	0%	0%	0%	100%
	Total	n	0	0	0	1	0	0	0	1
		%	0%	0%	0%	100%	0%	0%	0%	100%
Glimepiride & Glibenclamide	Male	n	0	0	0	1	0	0	0	1
		%	0%	0%	0%	100%	0%	0%	0%	100%
	Total	n	0	0	0	1	0	0	0	1
		%	0%	0%	0%	100%	0%	0%	0%	100%
Metformin	Male	n	1	0	1	3	3	3	5	16
		%	6%	0%	6%	19%	19%	19%	31%	100%
	Female	n	0	1	3	2	1	3	2	12
		%	0%	8%	25%	17%	8%	25%	17%	100%
	Total	n	1	1	4	5	4	6	7	28
		%	4%	4%	14%	18%	14%	21%	25%	100%
Metformin & Glibenclamide	Male	n	0	0	0	0	0	0	1	1
		%	0%	0%	0%	0%	0%	0%	100%	100%
	Total	n	0	0	0	0	0	0	1	1
		%	0%	0%	0%	0%	0%	0%	100%	100%
Metformin & Gliclazide	Male	n	0	0	0	0	1	0	2	3
		%	0%	0%	0%	0%	33%	00%	67%	100%
	Female	n	0	0	0	0	0	1	1	2
		%	0%	0%	0%	0%	0%	50%	50%	100%
	Total	n	0	0	0	0	1	1	3	5
		%	0%	0%	0%	0%	20%	20%	60%	100%
Metformin & Sitagliptin	Female	n	0	0	2	0	0	0	0	2
		%	0%	0%	100%	0%	0%	0%	0%	100%
	Total	n	0	0	2	0	0	0	0	2
		%	0%	0%	100%	0%	0%	0%	0%	100%

Table 4.55. Sex * Body weight today (Kg)* if yes please specify the name(s) of tablet medication you took Cross tabulation

Name(s) of tablet medication you took			Body weight today (Kg)						Total
			50-59	60-69	70-79	80-89	90-99	100+	
Don't Know	Male	n	0	0	3	1	3	3	10
		%	0%	0%	30%	10%	30%	30%	100%
	Female	n	2	1	1	4	2	2	12
		%	17%	8%	8%	33%	17%	17%	100%
	Total	n	2	1	4	5	5	5	22
		%	9%	5%	18%	23%	23%	23%	100%
Glibenclamide	Male	n	0	2	0	0	0	1	3
		%	0%	67%	0%	0%	0%	33%	100%
	Total	n	0	2	0	0	0	1	3
		%	0%	67%	0%	0%	0%	33%	100%
Gliclazide	Male	n	0	0	1	0	0	0	1
		%	0%	0%	100%	0%	0%	0%	100%
	Total	n	0	0	1	0	0	0	1
		%	0%	0%	100%	0%	0%	0%	100%
Glimepiride & Glibenclamide	Male	n	0	1	0	0	0	0	1
		%	0%	100%	0%	0%	0%	0%	100%
	Total	n	0	1	0	0	0	0	1
		%	0%	100%	0%	0%	0%	0%	100%
Metformin	Male	n	0	2	3	4	5	2	16
		%	0%	13%	19%	25%	31%	13%	100%
	Female	n	0	1	3	3	1	4	12
		%	0%	8%	25%	25%	8%	33%	100%
	Total	n	0	3	6	7	6	6	28
		%	0%	11%	21%	25%	21%	21%	100%
Metformin & Glibenclamide	Male	n	0	0	0	1	0	0	1
		%	0%	0%	0%	100%	0%	0%	100%
	Total	n	0	0	0	1	0	0	1
		%	0%	0%	0%	100%	0%	0%	100%
Metformin & Gliclazide	Male	n	0	0	1	0	2	0	3
		%	0%	0%	33%	0%	67%	0%	100%
	Female	n	0	0	0	0	1	1	2
		%	0%	0%	0%	0%	50%	50%	100%
	Total	n	0	0	1	0	3	1	5
		%	0%	0%	20%	0%	60%	20%	100%
Metformin & Sitagliptin	Female	n	0	2	0	0	0	0	2
		%	0%	100%	0%	0%	0%	0%	100%
	Total	n	0	2	0	0	0	0	2
		%	0%	100%	0%	0%	0%	0%	100%

Referring to the data related to patients with kidney disease presented in table 4.54, we can see that 31% of males (n=5) with 100 kg weight or above took metformin, followed by 19% of them distributed equally to three categories of weight namely 70 to 79, 80 to 89, and 90 to 99 kg weight.

With respect to females group, 25% (n= 3) of them who were between 60 to 69 kg weight took metformin, followed by 25% with 90 to 99 kg weight took the same medication.

When reflecting the data obtained for body weight today (Table 4.55) with sex and medication took by the patients, 31% (n=5) of males with 90 to 99 kg weight took metformin, followed by 25% of them with 80 to 89 kg weight took the same medication. Regarding females group, 33% of them who were 100 kg weight or above took metformin, followed by 25% of them distributed equally to two categories of weight namely 70 to 79 kg and 80 to 89 kg weight took the same medication.

Original Age * How long has it been since you were first diagnosed with kidney disease? Circle one) * Age Current * sex Cross tabulation

Sex	Current Age	Original Age		How long has it been since you were first diagnosed with kidney disease?					Total
				1 year	1-3 years	3-5 years	5-10 years	other	
Male	30-39	Less than 20	n	0	0	0	1	0	1
			%	0%	0%	0%	100%	0%	100%
		20-29	n	0	1	1	1	0	3
			%	0%	33.3%	33.3%	33.3%	0%	100%
		Total	n	0	1	1	2	0	4
			%	0%	25.0%	25.0%	50.0%	0%	100%
	40-49	20-29	n	0	0	0	1	1	2
			%	0%	0%	0%	50.0%	50.0%	100%
		30-39	n	0	1	0	0	0	1
			%	0%	100%	0%	0%	0%	100%
		Total	n	0	1	0	1	1	3
			%	0%	33.3%	0%	33.3%	33.3%	100%
	50-59	20-29	n	0	0	0	3	0	3
			%	0%	0%	0%	100%	0.0%	100%
		30-39	n	0	1	0	0	0	1
			%	0%	50.0%	0%	12.5%	37.5%	100%
		40-49	n	1	0	0	0	0	1
			%	100%	0%	0%	0%	0%	100%
		Total	n	1	4	0	4	3	12
			%	8.3%	33.3%	0%	33.3%	25.0%	100%
	60+	20-29	n	0	0	2	2	0	4
			%	0.0%	0.0%	50.0%	50.0%	0%	100%
		30-39	n	0	1	2	2	0	5
			%	0.0%	20.0%	40.0%	40.0%	0%	100%
		40-49	n	0	0	1	2	0	3
			%	0.0%	0.0%	33.3%	66.7%	0%	100%
		50-59	n	2	1	1	2	0	6
			%	33.3%	16.7%	16.7%	33.3%	0%	100%
		60+	n	2	0	1	1	0	4
			%	50.0%	0%	25.0%	25.0%	0%	100%

			%	50.0%	0.0%	25.0%	25.0%	0%	100%
		Total	n	4	2	7	9	0	22
			%	18.2%	9.1%	31.8%	40.9%	0%	100%
Female	30-39	20-29	n	0	0	0	1	0	1
			%	0%	0%	0%	100%	0%	100%
		Total	n	0	0	0	1	0	1
			%	0%	0%	0%	100%	0%	100%
	40-49	less than 20	n	0	1	0	0	0	1
			%	0.0%	100%	0.0%	0.0%	0%	100%
		20-29	n	1	2	1	1	0	5
			%	20.0%	40.0%	20.0%	20.0%	0%	100%
		30-39	n	1	0	1	1	0	3
			%	33.3%	0.0%	33.3%	33.3%	0%	100%

Continuing:

Sex	Current Age	Original Age		How long has it been since you were first diagnosed with kidney disease?					Total
				1 year	1-3 years	3-5 years	5-10 years	other	
Female		40-49	n	2	3	2	3	0	10
			%	0.0%	0.0%	0.0%	100%	0%	100%
		Total	n	2	3	2	3	0	10
			%	20.0%	30.0%	20.0%	30.0%	0%	100%
	50-59	Less than 20	n	0	0	1	0	0	1
			%	0.0%	0.0%	100%	0.0%	0.0%	100%
		20-29	n	0	0	2	2	0	4
			%	0.0%	0.0%	50.0%	50.0%	0.0%	100%
		30-39	n	0	0	0	0	2	2
			%	0.0%	0.0%	0.0%	0.0%	100%	100%
		40-49	n	2	1	0	0	1	4
			%	50.0%	25.0%	0.0%	0.0%	25.0%	100%
		Total	n	2	1	3	2	3	11
			%	18.2%	9.1%	27.3%	18.2%	27.3%	100%
	60+	20-29	n	0	1	1	0	0	2
			%	0.0%	50.0%	50.0%	0.0%	0%	100%
		30-39	n	0	1	3	0	0	4
			%	0.0%	25.0%	75.0%	0.0%	0%	100%
		40-49	n	1	3	1	0	0	5
			%	20.0%	60.0%	20.0%	0.0%	0%	100%
		50-59	n	0	2	2	1	0	5
			%	0.0%	40.0%	40.0%	20.0%	0%	100%
		Total	n	1	7	7	1	0	16
			%	6.3%	43.8%	43.8%	6.3%	0%	100%

Among the group of males, the patient who reported that he was less than 20 years old at the time of original diabetes diagnosis shifted to the next age groups (30 to 39) which indicated that he suffered diabetes stay for more than 10 years. Between 5 to 10 years passed since he was first diagnosed with kidney disease.

Among the group of females, one of the two patients who reported that they were less than 20 years old at the time of original diabetes diagnosis shifted to the next age groups (40-49), while the other woman became between 50-59 years old, which indicated that the diabetes stay with them for more than 10 years. The number of years passed since they were first diagnosed with kidney disease varied between 1 to 5 years.

We can observe that 9 of the males patients (41%) and 6 of the females patients (55%) who were between 20 to 39 years old at the time of original diabetes diagnosis has become 60 years and above, and they experienced 3 to 10 years with kidney disease . T-test indicated that no significant differences in percentages attributed to gender when studying changing in age and time since experienced kidney disease (Sig.>0.05).

4.4 Qualitative analysis of patients' comments about their renal disease.

Now I will focus on the *Closing Remarks and Comments* section on the questionnaire given to patients. The question asked was, "*Do you have any comments to make regarding your condition, so it may be used in medical research?*"

Table 4.54 Non Kuwaiti patients

Patient No	HbA1c	Eye Examination by fundus	Blood test	Dietician	Medications	Lack of empathy	Treatments/ Diagnosis	Patients' knowledge	Private hospital
1						★	★		
2						★	★		
3						★	★		
4		★	★	★		★	★		
5			★	★		★	★		
6						★	★		
7						★	★		
8			★			★	★		★
9						★	★		
10			★			★	★		★
11						★	★		
12					★	★	★		
13							★		
14					★	★	★		
15						★	★		
16						★	★		
17			★			★	★		
18	No Comment								
19 A				★		★	★		
20 B						★	★		
21	No Comment								
22			★			★	★		
23						★	★		
24	No Comment								

From this complex table two major areas of concern were found for non-Kuwaiti patients, namely. 1. Bad treatment and diagnosis - this was highlighted by 21 out of the 24. 2. Lack of empathy (Doctors /Nurses) and education or skill - this was highlighted by 20 out of the 24.

Table 4.55. Kuwaiti patients

Patient No	HbA1c	Eyes Examination by fundus	Blood test	Dietician	Medications	Lack of empathy	Treatments/Diag nosis	Patients knowledge	Private hospital
1			★	★		★	★		
2		★	★	★		★	★		★
3			★			★	★		★
4						★	★		
5						★	★		
6	★	★	★	★		★	★		★
7						★			
8	★		★		★	★	★		
9		★			★	★	★		★
10						★	★		
11						★	★		★
12			★			★	★		★
13						★	★		
14						★	★		
15						★	★		
16						★		★	
17	★		★			★	★	★	
18	★		★		★	★	★		
19						★			
20		★	★			★	★		★
21	No Comment								
22						★	★		★

23			★			★	★		
24	No Comment								
25						★	★		
26			★			★	★		
27			★		★	★	★		★
28		★	★			★	★		★
29					★	★			
30						★	★		
31			★	★		★	★		★
32						★	★		
33	No Comment								
34			★			★	★		★
35	No Comment								
36					★	★	★		
37						★	★		
38						★	★		★
39						★	★		
40			★			★	★		
41	No Comment								
42			★			★	★		
43						★	★		
44	No Comment								
45 ^a				★		★	★		
46						★	★		
47						★	★		
48						★			
49						★	★		★
50	No Comment								
51				★		★	★		★
52						★	★		
53	No Comment								
54				★		★	★		
55	No Comment								

From this complex table two major areas of concern were found for non-Kuwaiti patients.

1. Lack of empathy (Doctors /Nurses) and a lack of education or skill – this was highlighted by 46 out of the 55.
2. Poor treatment and diagnosis –this was highlighted by 41 out of the 55.

For the sake of comprehensiveness and clarity the tables above could not include some of the data the patients provided. Consequently, the additional comments they made are marked with a *letter* next to each patient's number in the table above. An explanation of each of these letters now are the following;

Patients 19^A and 20^B of non –Kuwaiti patients and 45^A had received a kidney transplant.

For patient 19 the kidney was rejected .

For patient 20, who was a non-Kuwaiti, he suffered from “water in his lungs” (pulmonary oedema) and the creatinine has increased and he was worried that he will suffer again from kidney failure. He mentioned that due to the carelessness of the physician and bad treatment also due to lack of information about diet he suffered from these complications.

Patient 45^A had a kidney transplant and the body rejected it. He mentioned that the physician did not mention for him which type of food he should avoid when his body temperature increases. When he went to the hospital the physician mentioned to him that his kidney had failed and that's because he did not stop eating some type of food and he was very upset and blamed his physician.

Table 4.54 shows that 21 of 24 (87%) non -Kuwaiti patients gave their comments, and Table 4.55 shows that 46 of 55 (83%) Kuwaiti patients gave their comments. These high ‘completion rates’ enables major statements to be made and are grouped together as areas of concern.

The **first area** for concern of both 46 Kuwaiti and 20 non Kuwaiti patients was that the majority of the clinical workers did not have sufficiently developed skills or

empathy. Doctors and Nurses were commonly accused of not providing sufficient attention and consideration to their problems.

The **second area** - was that they considered the effectiveness of their treatment to be either inadequate in terms of meeting their desires, or even inadequate in terms of healthcare standards and principles. Although the diabetic physician were caring, and treated /diagnosed the diabetic patient properly the majority had discovered their kidney problem by accident. For example the majority had kidney pain, difficulty in breathing, vomiting, body pain, weakness, high body temperature and in some cases had suffered a coma. When they went to the hospital they mentioned to them that they had kidney disease, the severity of which required kidney dialysis.

One patient mentioned that she has been suffering from breast cancer and when she had a blood and urine test they told her that she had kidney disease.

Another patient broke his leg and the doctor in the Alrazi hospital (orthopedic Hospital) mentioned to him that he had kidney disease.

Another patient had a heart attack then discovered he had kidney failure.

Some patients discovered their kidney problem when they travelled to another country for a health check-up for example UK, Lebanon and Germany.

In another case a patient suffered from great weakness, body pain and vomiting and so he went his physician, described his symptoms and the physician prescribed paracetamol and an anti-emetic. Despite this he still did not feel well and so went to a hospital casualty unit, in which gave him the same medicine. He continued to take this medication for more than one year without any improvement so he went to another hospital where they mentioned that he has kidney failure

A female patient's blood pressure was too high but her diabetic physician did know what was the reason for her condition. So she went to a private hospital where they mentioned to her that she had kidney disease. So she went to her diabetic physician and she asked her to transfer her to a nephrologist in the hospital but she was refused. After that she had suffered from severe headaches and pain in all her body so she went to the casualty unit in the hospital where they transferred her to a nephrologist.

The **third area** - 17 Kuwaiti and 6 non-Kuwaiti patients were worried that no blood analysis had been done in the diabetic clinic and this had resulted in their kidney disease being undiagnosed.

The **fourth area** - 15 Kuwaiti and 2 non-Kuwaiti patients considered the private hospitals physicians were more caring about them than those in the MOH clinics

because their kidney disease was only made known to them through private hospitals. The private hospital physicians, the patients thought were empathetic than those in the MOH diabetic clinics because they listened to their problems.

The **fifth area** - 7 Kuwaiti and 3 non-Kuwaiti patients were concerned that the system did not transfer them to a dietitian and they did not know what the best type of food should be eaten. One patient mentioned that his kidneys failed after renal transplantation because he thought he had eaten 'inappropriate food'.

The **sixth area** - 6 Kuwaiti patients and 2 non-Kuwaiti when they mentioned to their physicians that they had kidney pain or were suffering from nausea and/or vomiting had had prescribed an analgesic and anti-vomiting medications. In many these prescribed medications were ineffective and only later they found out that they had kidney disease

The **seventh area** - 5 Kuwaiti patients and one non-Kuwaiti patient Were worried that diabetic physicians in their clinics did not know how to check their eyes with the fundus camera, and they were not transferred to an ophthalmologist. Some mentioned they had bleeding in their eye and for this reason they went to private hospital.

The **eighth area** - 4 Kuwaiti patients were concerned that the diabetic physicians did not routinely measure their levels of HbA_{1c}. Some mentioned that the last time a blood test to check the HbA_{1c} was done "some time ago".

The **ninth area** - was expressed by just two Kuwaiti patients who did not know anything about their kidney problem or about their medications and surprisingly one of them thought that he did not suffer from kidney disease and he was in renal clinic just for routine check-up.

Summary of the findings:

1. The Kuwaiti patients had suffered renal disease for a mean duration of 21 years and 18 years for non-Kuwaitis. When the ages were statistically compared using Student's t test, there was no significant difference in terms of age of onset between Kuwaitis and non-Kuwaitis (p-values were 0.392 and 0.082 respectively).
2. The mean current body weight was 86.2 kg (SD \pm 17.8 kg), and the mean of weight at first diagnosis was 85.4 kg (SD \pm 20.7 kg). No difference was found on analysis.
3. The BMI values were calculated and compared using Student's t test. For the Kuwaiti group, it was 29.9 kg/m² (SD \pm 7.1 kg/m²) at first diagnosis and at the time of the study it was 31.1 kg/m² (SD \pm 7.0 kg/m²). We have no evidence against the null hypothesis, therefore, there was no significant difference (p>0.05). For the non-Kuwaiti group, the BMI values were 33.0 kg/m² (SD \pm 6.1 kg/m²) at first diagnosis and at the time of the study were 31.5 kg/m² (SD \pm 5.2 kg/m²). Although the first value in the table appears to be greater than the second, due to the numerical range no statistical significant difference was found (p>0.05). This use of BMI instead of body weight perhaps was therefore perhaps not a useful comparison to make.
4. The majority of Kuwaiti males and females reported that they stopped taking tablet medication for their diabetes (89% and 83%) respectively, while within Non-Kuwaiti patients it is clear that 93% of males and 80 % of females indicated that they do not take the medicine now.
5. Although all patients had taken oral medications for their type 2 diabetes in the past, a large number were now receiving insulin as their primary treatment for their disease. In some cases they stopped both oral and insulin medications during renal dialysis. Kuwaiti and non-Kuwaitis tended to use insulin for different length of times.
6. 87.3% of Kuwaitis and 91.7% of non-Kuwaiti had hypertension. Moreover, the percentage of males among the two groups who had hypertension was greater than the percentage of female among the two groups.

7. 3.8% of Kuwaiti males indicated that the physician who conducted their eye examination was a primary care doctor, while 96.2% indicated the physician who conducted their eye examination was an eye specialist. Additionally, 100% of non-Kuwaiti males (n=13) indicate that physician who conducted the eye examination was an eye specialist. Moreover, none of Kuwaiti females and 10.0% of non-Kuwaiti females respectively indicate that the physician who conducted their eye examination was a primary care doctor. When this data was compared using Pearson chi-square test the results showed no significant association between nationality and the type of specialist who conducted the eye examination attributed to sex under 5% level of significance, since the p-values were 0.332 and 0.244.

8. 77.8% and 67.9% of Kuwaiti males and females had received laser treatment for their eyes, while 71.4% and 60.0% of non-Kuwaiti males and females had had laser treatment for their eyes.

9. 85.2% and 82.1% of Kuwaiti males and females indicated that they experienced a foot problem. Among the non- Kuwaiti group, 85.7% of males and 90% of females reported that they experienced a foot problem.

10. 58.2% of the sample who had cardiac problems were Kuwaiti, while 37.5% were non-Kuwaiti. For those Kuwaiti who had cardiac problems 18 were males and 14 female. For non-Kuwaiti 's there were 6 males and 3 were females. On analysis there is no significant association between nationality and heart problems attributed to sex under 5% level of significance, since the p-values were 0.210 and 0.521.

11. 40.7% of Kuwaiti patients who had been told by the primary care doctor that they had kidney disease were males (n=11), with 25% were females (n=7). Among the non- Kuwaiti patients 14.3% of them were males (n=2) and indicated that they had been told by the primary care doctor that they had kidney disease, while 20% of them were females (n=2).

12. Among the Kuwaiti patients, 87.3% of them (24 males and 24 females) indicated that they knew what is the stage of their kidney disease, compared to 75% of non-Kuwaiti patients . The proportions of Kuwaiti and non-Kuwaiti patients who did not

know what the stage of their kidney disease were 12.7% and 25% respectively. It is worth mentioning here; the stage of kidney disease which the patients were left was the stage 5-kidney failure. The chi-squared test indicated no association between nationality and knowledge of the disease's stage attributed to sex, since p values were 0.724 & 0.633 respectively.

13. 27.3% and 16.7% of Kuwaiti and non-Kuwaiti patients indicated that they had a family history of kidney disease.

14. 64 patients out of 79 indicated that they were having renal dialysis (46 were Kuwaiti (23 males, 23 females) and 18 non-Kuwaiti (11 males, 7 females).

15. 14 of them had a kidney transplant - 6 Kuwaiti males and 5 Kuwaiti females, and 3 non-Kuwaitis (one male and 2 females).

16. 65.5% and 65.2% of Kuwaiti and non-Kuwaiti patients respectively, reported they had been told they were anemic.

17. 69.1% and 58.3% of Kuwaiti and non-Kuwaiti patients were told that they had 'weak bones'. The proportion of females who had been told they had 'weak bones' was greater than males. Moreover, 60.5% (n=23) and 42.9% (n=6) of Kuwaiti and non-Kuwaiti patients stated that they had 'weak bones' for 3 years or less.

18. The **major area** for concern of both 46 Kuwaiti and 20 non Kuwaiti patients was that the majority of the clinical workers did not have sufficiently developed skills or empathy. Doctors and Nurses were commonly accused of not providing sufficient attention and consideration to their problems.

Chapter 5

5. Results from the examination of medical files in Kuwait.

Patient files were found to be of two types: written by hand and in an electronic format. Of the thirteen clinics used in this study 11 had the traditional paper records and 2 an electronic format. Irrespective of the type of record, for each patient the data was checked and since no copy could be made key facts were abstracted and entered on an anonymous record sheet. A summary of some of the key findings for all 109 patients is recorded below.

Surprisingly, the majority of patient files were incomplete from all the clinics which were used for this study. Ten examples will be given of this incompleteness.

Example 1. As an example to illustrate this ‘incompleteness’ in one patient the records for his blood and urine tests for example records existed for 2012 but not for either 2013 or 2014. .

Example 2. In another patient’s file the last record of blood and urine tests which were carried out was for 2010 and so this suggests that no tests were done in 2011, 2012, 2013 and 2014. Their blood values were therefore at the time of this study four years out of date.

Example 3. Although many files had poor records of blood and urine tests perhaps the most startlingly was that found for a patient in whose file the latest records were those of 2002 – this is not a mistake – 2002.

Example 4. Many files contain very few recent records of blood and urinary levels. In some the most recent records are from 2009 and for many other patients there are actually no records of blood and urine tests.

Example 5. In many cases the weight of the patient at the time of the first diagnosis, and the provision of body heights were in the minority. Patient BMI calculations were never found in any file.

Example 6. Some records – a minority – included details of the dietary advice given to patients. However for the majority this data was simply lacking. ,

Example 7. Comments about the examination of the feet was absent for the majority of files.

Example 8. The levels of HbA1c were very rarely recorded

Example 9. The examination of patients' eye using the fundus camera to provide data for diagrams in the patients notes or an actual photograph were extremely limited. **Example 10.** The files made no mention of whether a patient smoked or drank alcohol.

After these examples a more positive finding was made in example 11.

Example 11. It is very interesting that it was found in the files that the name of diabetes medications which was prescribed for the diabetic patients and also the name of an eye drop and eye ointments. The prescribing of eye medications was somewhat surprising as it was made by the diabetic physician against a background of not using the diabetic fundus camera or transferring them to an ophthalmologist.

This lack of detail in the files was not expected but perhaps not unsurprising considering what the patients had provided in their questionnaires.

This finding supports Al-Taweel et al., 2013 which mention " this study revealed incomplete documentation of patients records at both primary and secondary care settings. In order to insure optimum continuity of care between health and situations and personals attentions to adequate documentation should be encouraged. "

Surprisingly which was found in this study about patient file disagrees with

Al-Adsani et al., 2008 which mention that over a five study period the patients' files became more organized and structured from 60 – 100% ($p < 0.001$). The prevalence of smoking assessment, eye and foot examination increased significantly from 2.8 to 27.2% ($p < 0.001$), 2.4 to 31.6% ($p < 0.001$) and 0.4 to 40.4% ($p < 0.001$) respectively. For microalbuminuria the figures were 4.4% to 26.4% and for HbA1c levels the values were 10.4 to 60.8% ($p < 0.001$) These findings although promising led to the suggestion that national diabetes educational program's required continuous development to improve diabetes care.

And also with Al Shaheen et al., 2011, which mentions the patients score for complying with their treatment started with an average value of 7.5% and after three years had a value of 24.6%. For HbA1c the values started at a 31% adherence and at the end was 46.5% adherence, a change which had a p value of <0.001. This suggests a significant improvement in their standard of care. This study also measured microalbuminuria, the limits of which was set at <20mg/L, and at the end of the study 85.2% of the subjects had achieved this value. The highest improvement was for the fundus examination which at the beginning of the study was 53.5% and the end was 76.6%.

Summary and Implications

This finding is line with the preliminary hypothesis and answered the third question

Do patient notes provide an accurate research tool for the analysis of treatment strategies of type 2 diabetes patients?

The findings made for this thesis do not support to the hypothesis that the patient notes provided answers about a patient's treatment since the majority of patients file were incomplete and provide little detail of patient treatments.

Chapter 6

6. Results from the structured interviews of Kuwaiti and UK physicians.

6.1 Kuwaiti's physicians - Introductory comments.

In addition to the previous patient questionnaires, some surveys were conducted with consultants in Kuwait for additional supplementary data collection and analysis, regarding topics relevant to diabetes and renal failure.

Seven consultants, four nephrologists and three ophthalmologists agreed, to participate in this supplementary study, providing evidence regarding the interactions between patients and physicians. This thereby serves to establish any links the findings from patients and from these physicians, contributing to a well-rounded perspective while further reducing the potential for bias from any area and so this would enhance the reliability of the data.

These questionnaires contained only four - five questions on the insistence of the Kuwaiti Ministry of Health so as not to overload the consultants with extensive questionnaires (see Appendix 4).

6.2 Interview Results for Kuwaiti physicians.

What, in your clinical experience, are the major causes of kidney disease?

Nephrologists	Nephrologists Comments
1	Provided with a variety of answers: a) blood pressure, b) diabetes, c) the combination of blood pressure and diabetes, and d) family history of kidney failure. Comment. This combination of factors is commonly acknowledged in the world literature; with the consultant pointing out that the combination of such factors along with genetics sets patients at an especially high predisposition to kidney disease.
2	provided similarly meaningful results for the same questions asked above.
3&4	The consultants were at great pains to emphasise that in their opinion, diabetes was the most common cause for this condition in Kuwait.

What are the most common kidney tests which should be done?

Nephrologists	Nephrologists Comments
1	<p>The consultant answered stating that the most common tests were urine tests for protein (urinary albumin test), and blood tests for creatinine.</p> <p>Comment. The results of these tests are primarily used to find protein loss from the kidney and the glomerular filtration rate (GFR) both of which assess kidney function.</p>
2	<p>Stated the most common kidney tests include blood tests (measuring build up and waste for example urea), urine tests assessing the protein and electrolyte levels and abdominal ultrasound scan were also recommended.</p>
3&4	<p>The consultants answered in a very similar way to consultant number 1. They stated that the most common urine tests were for protein (urinary albumin test), and blood tests for creatinine and urea.</p>

How often the patient should be tested?

Nephrologists	Nephrologists Comments
1	<p>The response was, “every six months ... but if there is, for example, micro albumin in his urine- [they] should be tested every three months until it returns to a stable value when six month tests are re-instated.” Comment. Not required as the answer was very comprehensive.</p>
2	<p>The frequency of the recommended patient testing was every six months if there were no problems and three months if there were obvious problems.</p>

3&4	The response was again very similar to consultant number 1. In summary, of a very comprehensive answer, it reads very like consultant number 1. “every six months ... but if there is, for example, micro albumin in his urine- [they] should be tested every three months until it returns to a stable value when six month tests are re-instated.”
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How does the patient know if they have poor renal function?

Nephrologists	Nephrologists Comments
1	“Early kidney disease doesn’t have clear and precise symptoms, so testing is the only way to know how the kidneys are working. It is important that the patient gets tested for kidney disease if they have the key risk factors (diabetes, high blood pressure, family history of kidney failure and heart disease).”
2	“In the beginning of kidney failure [patients may] not be producing any symptoms, but if the kidney function decreases, this may produce pain in some patient change in colour of urine, turbidity in urine, weakness, shortness of breath, and wastes product in blood [leading to] losing the appetite. This will progress to the point where the mental function will decrease and coma may occur.”
3&4	That it was only by using suitable tests that the physician could establish that patient’s kidneys were working at a normal rate.

Have you ever seen a diabetic patient with a final stage of a kidney disease due to not being referred at the onset of the renal problems?

Nephrologists	Nephrologists Comments
1	Yes, if the physician controls the glucose and the blood pressure”. He further commented in general on the reduced risk of

	<p>kidney complication, stating that the presence of indicators (i.e. micro albumin) should result in the transfer to a kidney consultant. Such instances have led to increased awareness initiative, but have not completely resolved the problem, thereby being a considerable factor in the continued existence of cases representing a need for reform or improvement.</p> <p>Comment. Not required as the answer was very comprehensive.</p>
2	<p>Yes, regarding untreated patients, this physician stated final stage renal disease is common when inadequate treatment has been used and is an area in need of significant development. He stated, “many these [cases] are because the diabetic is not well controlled by the primary care doctor. For example, if he doesn’t do a blood test every 6 months and even if this test is carried out, some of them do not transfer their patients to the nephrologist from the beginning. In some cases, the patients come to the hospital and they thought they had asthma due to shortness of breath, and when we do a blood test for the patient, they find they have the end stage of kidney disease. Some of the patients are admitted to the hospital due to coma, and then we find they are undergoing kidney failure.”</p>
3&4	<p>Yes, many and some of them they came to the hospital and they needed immediate dialysis because their condition was so critical. This problem is extremely sad because some of them were in the age from 20-30 years (especially type 1). This perhaps is primarily related to the problem of the primary care doctors not carrying out suitable tests due to their knowledge of both the patient and the physician. Clearly some education of both parties should be enhanced.</p>

General comment common to all the nephrologists interviewed.

All the renal consultants who were interviewed expressed the view that primary care doctors require a more comprehensive knowledge of the renal problems in diabetes in order that their patients’ treatment could be improved.

Ophthalmologists

How often do you think that the diabetic patients' eyes should be checked?

Ophthalmologists	ophthalmologists comments
1	Annually, when there were no obvious problems, and every six months when there were retinal changes, and every three months for any 'moderate' changes.
2	Annually or every six month, when there were no obvious problems, and every 2 to 3 months when there were mild to moderate change retinal changes, and every month for any" saver" changes.
3	This respondent provided similar comments as the previous consultant, emphasising the need at all times to support the patient.

What do you think is the best strategy to ensure that the treatment reduces the value of proliferative retinopathy?

Ophthalmologists	Ophthalmologists comments
1	"The primary care doctor should check the eye of the patient by fundus camera...if there's any change in the retina, he should not prescribe any medication for the patient, so he should transfer him to a specialist ophthalmologist." (Note: the fundus camera is a specialized piece of equipment which photographs the interior surface and retina showing very accurately the distribution of the blood vessels and any extravascular deposits.
2	"The primary care doctor should check the eye of the patient by fundus camera...if there's any change in the retina, he should transfer him to a specialist ophthalmologist."
3	This respondent provided similar comments as the previous consultant.

How long does it take for the first diagnosis of retinopathy to progress to blindness?

Ophthalmologists	ophthalmologists comments
1	The ophthalmologist provided a detailed answer for this, stating “if the primary care doctor controlled the blood pressure and the diabetes well, and if he found any changes [with the] fundus of the eye, he should transfer him to an ophthalmologist; [this is] because the diabetic patient may get problems in his eye in the first 10 years from the diabetes, and changes may happen as they age. Up to 50% of changes may happen and as the patient grows, more changes occur; so if the patient was transferred from the beginning to a retinopathy consultant, the eye will perhaps stay stable, and no complication will occur.” Surgery was also mentioned, but only as a potential solution.
2	“If the primary care doctor controlled the blood pressure and the diabetes well, and if he found any changes [with the] fundus of the eye, he should transfer him to an ophthalmologist; [this is] because the diabetic patient may get problems in his eye in the first 5 years from the diabetes, so if the patient was transferred from the beginning to, an ophthalmologist the eye will perhaps stay stable, and no complication will occur. If the patient is not treated very well during two years the patient will become blind.
3	“If the primary care doctor controlled the blood pressure and the diabetes well”. He also added that, “The high blood pressure and diabetes should be controlled also control the HbA1C and give patients Lipanthyl to decrease the eye complications. And if he found any changes [with the] fundus of the eye, he should transfer him to an ophthalmologist; [this is] because the diabetic patient may get problems in his eye in the first 5 years from the diabetes. So if the patient was transferred from the beginning to an ophthalmologist, the eye will perhaps stay stable, and no

	complication will occur. If the patient is not treated very well during two years the patient will become blind”
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Have you ever seen a diabetic patient with a severe eye problem due to not being referred at the onset of the ocular problems?

Ophthalmologists	ophthalmologists comments
1	Here, the respondent provided similar support as the previous nephrology consultant, again accounting for the reality and potential for severe cases of misdiagnosis, and need for improvements in both treatments and awareness. Their response was “yes, this reason is because the primary care doctors need more training, and they need to be more [informed] about diabetes. Diabetes is a very serious disease and will lead to very serious complications in the eye so the primary care doctors should be more aware about these complications, and any simple issue in the eye must be transferred to a consultant. If the physician was aware about these complications, this will let the patient be more aware about this disease, and they should give out booklets about eye complications due to diabetes. Perhaps more TV programs should be about these complications and also posters should be displayed in many locations. Without careful analysis of their patients condition physicians should not prescribe any medication for the patient.”
2	Many patients, especially the younger ones, in the age from 20-30 years become blind and this is due to the carelessness of primary care doctors. He mentioned if you “believe or not that some physicians don’t know that diabetes cause eye problems”. Also the AL Bahar hospital there is a zone until there turn comes. Many patients have severe eye problems and they came to the clinic alone without being transferred by the physician. This ophthalmologist said he is one of the doctors who taught the primary care doctors to use the fundus camera in Ministry of Health in Kuwait. He stated that “Unfortunately due to the

	<p>carelessness of the physician this can cause the progress of the eye problem”. The primary care doctors should know “that diabetes is a disease of blindness”. Also the Ministry of Health should increase the amount of inspection in the diabetic clinics. Nowadays some diabetic patients are aware that diabetes cause blindness but also the Ministry of Health should encourage patients more to be aware.</p>
3	<p>Is “yes, he saw many diabetic patients specially type 1 and their age is between 20-30 and they came to the clinic alone without the transfer from the physician and some of them are blind in only one eye and the rest are close to blindness are trying to treat it before they get blind. Some of the diabetic women are pregnant”. He also reported that” he had seen severe cases and when he checked their eyes he understood from their eye they have complication in their kidney and in their heart because the eye is the first step of this complication”. He recommended “educating the primary care doctors and we need eye assistant in the diabetic clinic to check the eye of the patient and of there are any problem with the eye of diabetic patient they should be transferred to the specialist”.</p>

6.3 Summary of the analysis of comments by physicians in Kuwait.

1. Comments of nephrologists about their current experiences in treatments of diabetic patients with renal disease due to diabetes. Each physician made a number of comments which have been listed below.

Table 6.1 Comments made by the nephrologists in this study.

Physicians number	1*	2*	3*	4*	5*	6*
1	+	+	+	+	+	
2	+	+	+	+	+	
3	+	+	+	+	+	+
4	+	+	+	+	+	+

Key: 1*diabetes /hypertension, 2* blood /urine test, 3* primary care doctor skill/education, 4*patients with final stage of renal diseases, 5* inadequate treatment, 6* patients knowledge.

From Table 6.1 column 1, the major areas of concern were found to be similar for all the nephrologists who took part in the study, namely: the major causes of kidney disease were a) blood pressure, b) diabetes this- was highlighted by all nephrologists.

From Table 6.1 column 2, the most suitable kidney test which should be done for the diabetic patients were a urine test and a blood test. The physicians recommended patient testing was every six months if there were no problems and three months if there were obvious problems like micro albumin - was highlighted by all nephrologists. From the results obtained from the patients this may be very difficult to ensure since many of them did not understand the renal problems they had and would not see the relevance of any tests they had to undergo. It was of interest to note that when the medical files were checked concerning this point for the majority of patients had no records of any tests being carried out. **Comment. These tests were not done for the majority of the patients**

From Table 6.1 column 3, regarding primary care doctor skill/education which has led to many untreated patients. These physicians stated that in their opinion, final stage renal disease is common when inadequate treatment has been used and is an area in need of significant development. **Comment. Primary care doctor education needs to be improved, which is also the major comment of the patients and UK Physicians.**

From Table 6.1 column 4 & 5. The physicians stated, “They saw many of patients with final stage renal disease because the patients’ diabetes is not well controlled by the primary care doctor. In some cases, the patients have come into the hospital because they thought they had asthma due to shortness of breath, but after doing a blood test for the patient, they found they had end stage of kidney disease. In a number of cases, some of the patients are admitted to the hospital due to coma, and then they find they are undergoing kidney failure. **Comment: These physicians’ comments were fully supported by the comments of the patients.**

From Table 6.1 column 6. Education of patients should be carried out to prevent any complication - was highlighted by two of the physicians. **Comment: The patients frequently made the comment that they felt their knowledge of their condition was inadequate. This was also commented upon by the UK physicians (Appendix 5&5A)**

2. Comments of ophthalmologists about their current experiences in treatments of diabetic patients with eye disease due to diabetes. Each physician made a number of comments which have been listed below.

Table 6.2 Comments made by the of ophthalmologists in this study.

Physicians number	1*	2*	3*	4*	5*	6*
1	+	+	+	+	+	+
2	+	+	+	+	+	+
3	+	+	+	+	+	

Key: 1* frequency of eye examinations, 2* fundus camera, 3* primary care doctor skill/education, 4* transfer to ophthalmologists, 5* inadequate treatment, 6* patients education

From Table 6.2 column 1, the major areas of concern were found to be similar for all the ophthalmologists who took part in the study, namely: the frequency of eye examinations in diabetic patients, should be according to the consultants annually, when there were no obvious problems, and every six months when there were retinal changes, and every three months for any ‘moderate’ changes. **Comment: This tests were not be done for the majority of the patients as determined from patients’ file and patients’ comments.**

From Table 6.2 column 2, the primary care doctors should check the eye of the patients by fundus camera.**Comment: This was not done for the majority of the patients as determined from both the patients' file and patients' comments.**

From Table 6.2 column 3, the primary care doctors need more training, and they need to be more [informed] about diabetes. Diabetes is a very serious disease and will lead to very serious complications in the eye so the primary care doctor should be more aware about these complications. **Comment : The patients' thought that they needed greater care and the fundus camera should be used.**

From Table 6.2 column 4. The consensus view was that if any problems arose with vision then any simple issue in the eye must be transferred to an ophthalmologists. **Comment: For the majority of the patients they stated that this simply did not happen. Also the evidence from their files shows that referral was not carried out.**

From Table 6.2 column 5. Many patients, especially the younger ones, in the age from 20-30 years had become blind and this is due to the carelessness of the primary care doctor and the rest who are close to blindness are trying to treat it before they get blind. Some of the diabetic women are pregnant with eye complications. One ophthalmologist also reported that he had seen severe cases and when he checked their eyes he understood from their eye they have complication in their kidney and in their heart because the eye is the first stage of the development of this complication.

From Table 6.2 column 6. Education of the patients', one ophthalmologist said more TV programs should be made and broadcast about these complications and also posters should be displayed in many locations to inform patients about their condition. **Comment . The patients also stated that they were not aware of the complications which could occur and they needed more information to be provided.**

Part of the study was designed to determine what the current treatment of diabetes was like in the UK. In order to compare the two systems both of which have guidelines to follow which are based on International norms. This may be considered to be quite selective since the hospital used for this was the Ascot Rehab and not a general hospital. However the hospital treated a large number of diabetic

patients from Kuwait. And as such they thought could provide their experiences of the treatments in Kuwait as clearly as the patients who were interviewed in Kuwait. These physicians it should be stressed were also concurrently treating both Kuwaiti and UK patients in bigger teaching hospitals and so their experience of diabetes is much larger than simply this specialist unit. (See Appendix 5&5A).

The full details of this part of the study is shown in the Appendix rather than the main body of the thesis but a few background details may be usefully presented in this part of the thesis.

6.4 Summary and Implications.

The results of the two custom questionnaires answered by seven consultants in Kuwait and five consultants in UK serves to address the potential for the bias in analysis, when only one or two questionnaires are obtained in a study. This comment is in line with the preliminary hypothesis. The capacity and observation of best practices appears to be sufficient for consultants, but the primary questionnaires reveal that numerous patient problems have developed in response to misdiagnosis or ignorance. The consultants acknowledged these problems and recommend improved training and awareness initiatives at a minimum to help local facilities reduce the chances of continuing trends detrimental to patient health.

Chapter 7

7. Discussion

7.1 Part A. Discussion of the diabetic patients' questionnaires in Kuwait **Introductory comment.**

The increasing prevalence of type 2 diabetes in Kuwait is considered by authors of papers about diabetes in Kuwait 'alarming'. Many people, including Kuwaitis and non-Kuwaitis are diagnosed with the condition every year (Al Khalaf *et al.*, 2010). With proper careful management, both by the medical 'systems' and also by self-management by the patient, the diabetic state can usually be successfully managed. However, why patients in Kuwait have problems treating their diabetes is the central topic that this thesis aimed to explore.

Diabetes Management

Although the usual presentation of diabetes mellitus (DM) are periods of acute elevated blood glucose levels (hyperglycemia) it is also a chronic condition of the endocrine disorder. Diabetes mellitus is characterized by defects in carbohydrate as well as protein and fat metabolism. This condition occurs due to impairment of insulin secretion that can be associated with or without insulin resistance (Mellitus, 2005).

According to a recent publication by Inzucchi *et al.*, (2012), the central/essential aim of diabetes management is to avoid the complications of diabetes, which have been well documented almost since the disease was first described. Consequently, the inadequate or lack of appropriate management of diabetes can adversely affect the health of patients, for example eye complications, nerve complications, renal complications and cardiovascular complications in addition to the increasing cost of treatment.

The management of the two types of diabetes, type 1 and type 2, essentially varies simply because they have different fundamental causes. Whereas individuals diagnosed with type 1 require treatment with insulin, in order to survive as soon as possible after diagnosis, the mainstay of treatment for type 2 diabetes mellitus should be dietary control (Jain and Saraf 2010). Insulin treatments aim to mimic the typical

physiological insulin secretion pattern, and this is achieved by using a variety of combinations be short-acting, intermediate-acting, long-acting or combination regimens. These combinations can be sometimes very complicated but are usually provided against a very clear educational background for the patient.

Although dietary control and exercise should be given priority in the initial management of type 2 diabetes (NICE, 2010) there are exceptions, but these should be expectations. For example, in severe cases of hyperglycemia in type 2 diabetes, insulin regimens can be used but not as first line treatments in the average patient. The use of insulin in type 2 patients is generally when they are obese and require diet control, exercise, and oral hypoglycemic agents (OHAs) have failed to bring the blood sugar towards normal values. It should be stressed that with strict dietary controls and exercise leading to weight loss, the progression of diabetes can be delayed or in some cases prevented. In addition, type 2 does not usually require insulin regimens because it is less acute as the production of insulin decrease in either effectiveness - due to insulin resistance - or a decline in the levels of this hormone over time. During this time period, insulin can still maintain glucose levels until about 50 % of the β islet cells are destroyed and lost their function. The function of these islet cells continues to decline with time irrespective of treatment leading to hyperglycemia. Consequently, after their disease has been active for many years and the decline of these cells assumes significant numbers there may be a need for regular insulin therapy. Through adequate and appropriate care, both hypo- and hyperglycaemia and impaired glucose tolerance (IGT) may be minimised.

Suitable diets for diabetic patients have been the subject of a considerable number of reviews, and several dietary changes are usually made as part of the effective control plan for a patient suffering from type 2 diabetes. The National Institute for Health and Clinical Excellence (NICE) recommends a diet that is the same for the general population for management of type 2 diabetes. It includes eating foods that have a high starchy fiber and low in fat content especially the saturated animal fat. The patients should also eat at least five portions of fruit and vegetable per day, and cut down on sugar and sugary foods. Drinking alcohol in moderation, and regularly exercising are highly recommended since exercise improves glucose utilization, thus lowering blood glucose.

Type 2 Diabetes Management in Kuwait and UK – arrangement of structures.

In efforts to effectively control diabetes and prevent its complications, the World Health Organization (WHO) encourages nations to develop programs that would enable them address the challenge of diabetes (WHO, 1999). Kuwait like many other countries have so far developed specific programs for diabetes management. In addition, there are established international clinical guidelines for the treatment of the disease one of which is very clearly described by Ceriello and Colagiuri (2008). The Government of Kuwait through the Kuwait Ministry of Health provides the overall management for diabetes free of charge to both the Kuwaitis and non-Kuwaitis, living in Kuwaiti, by funding specific diabetic clinics (Al-Adsani, 2008). The diabetes services are comprehensive as the services they offer and are at three levels of care, namely: the primary, secondary and tertiary levels.

The primary care services do not treat type 1 diabetics because they are treated exclusive in the hospital level of medical care. Consequently, these clinics only treat type 2 diabetics and these are described colloquially as ‘mini-clinics’. It was at these centers where the questionnaire studies were carried out to ensure that all the patients seen were suffering from type 2 diabetes and not type 1, to ensure the homogeneity of the sample population. The Kuwait Diabetes Care Program (KDCP) was developed to improve the quality of care to the diabetic patients in the primary health care (PHC) setting throughout Kuwait. It ensures that diabetes care is provided at the primary care level via several mini-clinics diabetic patients in the country.

If required due to complications of the disease these patients can be referred to the hospital service which is classed being the secondary level of care for these diabetic patients. It was at these centers where the part of the thesis involved with the renal complications was carried out.

Another level of care, which can be classed as a third type, is different from that provided by the Ministry of Health since these clinics are sponsored for employees by the individual companies such as Kuwait Oil Corporation (KOC).

This system is different to that found in the UK, which also the responsibility of the central government to provide adequate care to its citizens. It achieves this by providing universal access to care to all sections of the population in UK through the

National Health Service (NHS) (Mainous *et al.*, 2006). In 2001, the Department of Health published the National Service Framework for Diabetes. It sets out minimum standards for proper diabetes care and treatment targets for management of blood sugar, blood pressure, and cholesterol so as to reduce the risk of developing diabetic complications (Department of Health, 2001). The standards include **nine** basics of care that allow early detection of complication signs such as blindness and kidney disease. The National Institute for Care and Excellence (NICE), an NHS organization, provides clinical guidelines for the management of chronic conditions such as diabetes.

Comparative Treatment Guidelines and Treatment Studies

Due to the potential complexity of the condition and its consequences if not treated correctly for both the individual and the health care services of any country, then the NICE guidelines have been devised to try and optimise care.

It is true that treatment guidelines vary internationally and regionally, and can even vary within the nations, depending on the nature of treatment and facilities. For example, the same standards and procedures of care may be comprehensive in the UK for diagnostics, testing, and/or referrals. For surgery, if the latter this is necessary for severe complications such as gangrene, guidelines may be given but the precise nature of advice or preferences for specific types may vary. For medication(s) the advice tries to encompass a wide range of severities and so may vary between patients National Audit Office (NAO, 2012). However the guidelines still attempt to try and standardize medications even though this is dependent upon many patient factors which may be impossible to standardize such as duration, intensity and severity of the disease. All of these considerations have financial implications. For example, the NAO (2012) reported that the cost of diabetes treatments in the UK had risen from just under £1 billion in 2007 to over £1.3 billion in 2010. Although it should be stressed that these were only estimates and they suggested it was very likely that they were actually less than the real figures. Consequently, including the costs of medications, inpatient care and outpatient care, the NAO (2012) estimated the cost in 2010 was closer to £4 billion. The following figure presents percentages of registered patients treated throughout ‘care processes’ in the UK published in 2012.

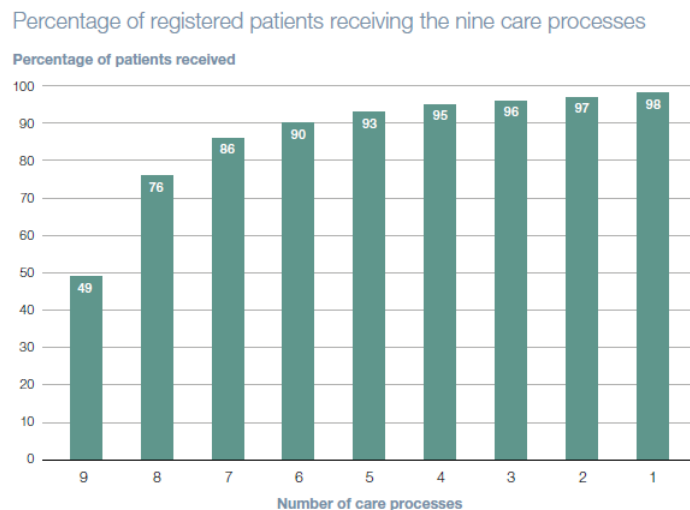


Figure 7.1. Trends in UK diabetic patient care (NAO, 2012)

The data shown on this bar chart is very interesting. Not unexpectedly, 98% those registered patients received 1 ‘care process’. This figure only dropped to 90% when they received 6 ‘care processes’. The figures then slightly declined to 86% for 7 ‘care processes’, 76% for 8 ‘care processes’ and 49 % received 9 ‘care processes’.

Consequently, this intensive number of ‘care processes’ which the diabetic patients have received is reflected in the cost of their treatment as mentioned above.

The NAO report (NAO,2012) also states that the greatest needs for improvement in the UK treatment are those which test for early signs of limb, eye, and kidney damage, while the costs incurred to address such damage are significant in the UK. The most common testing processes used to assess patient response to treatment were blood pressure tests and cholesterol tests, which were used in 94 percent of patients. These trends are similar in the United States, but comparative frequency of tests are not commonly discussed in the developing nations; for example, testing is much less common in Africa, and considerable less common in Kuwait (IDF, 2012; NAO, 2012). The NAO (2012) reported “significant variation” in health care procedures across primary care facilities, and stated;

“the proportion of people with diabetes receiving all nine basic care processes ranged from less than 10 percent in two primary care trusts up to no more than 69 percent in any primary care trust”... (NAO, 2012)

They then further commented that:

Some areas of England will have significantly more patients at risk of diabetes than others, but the Department cannot fully explain the variation of differences in local populations, socio-economic factors or local spending on diabetes services ... It is therefore likely that diabetes services are being affected by how local services are organised and managed, and their effectiveness” (NAO, 2012).

The report also had some very interesting findings which they presented using the following figure which shows some of the standards achieved for people with diabetes.

Achievement of treatment standards for people with diabetes recorded by the 2009-10 National Diabetes Audit

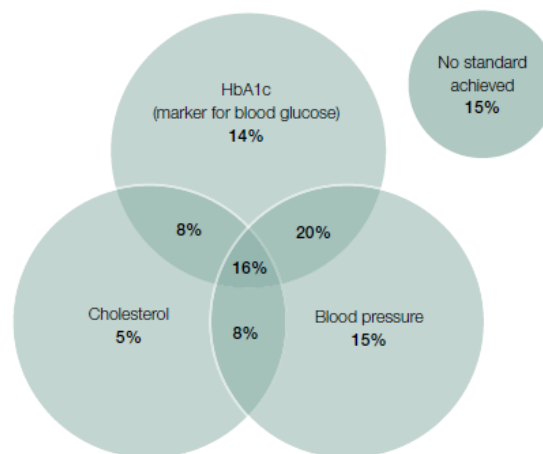


Figure 7.2. Treatment standards in the UK (NAO, 2012)

The data shown in Figure 9.2 is perhaps a little unexpected since only 16% of the patients had all the routine tests for HbA1c, Cholesterol and blood pressure. Even more unexpected perhaps was that only 14% were routinely checked for the HbA1c levels.

Other earlier studies have shed light on the nature of treatment in the UK, implying it is comparable to universal treatment in other developed countries, with matching technological potential that exceeds the capacities in some other nations. Khunti *et al.*, (2007) conducted an extensive review of studies of quality in UK diabetes care, using articles published between 1999 and 2006. The people involved in the selected studies (n = 83,098), with the researchers noting an inclination towards improving processes and positive outcome. Overall, the study found that the quality of care

established through developmental efforts was high, while there have been improvements in both outcome and process measures recorded in publications across the 21st century. Three years later, Gale (2010) published a study about UK primary care, noting major increases in consultations between 1997 and 2007, while drug costs nearly doubled, from £391 million to £740 million, during the same period. With this, however, the costs of glucose management were less than a third of the total cost. The author concluded “previous reports from primary care in the UK have been encouraging. The proportion of patients with a diagnosis of Type 2 diabetes and an HbA1c below 7.5%, for example, reportedly increased from 37.8% in 1997 to 54.9% in 2007:

‘... the most likely explanation is that the reported improvement in glucose control is because of earlier detection and more aggressive management of those in the earlier states of Type 2 diabetes’ (Gale, 2010).

However, in those patients with advanced pancreatic beta cell failure who did have similar access to being monitored and treated they were not therefore able to benefit in the same way that less advanced cases were able to do, which reflects on the improved benefits of the treatments over the past decade by monitoring the HbA1c values.

More recently, Dalton *et al.*, (2011) studied relationships between practice traits, patients, and exclusions from quality indicators for diabetes; here, the authors focused on the impact of the Quality and Outcomes Framework established in the UK, examining the aforementioned relationships across their first three years of relevance in the operations. Here, the electronic medical records of diabetic patients from 23 practices were assessed, and exclusions and three outcome indicators were assessed in the care provided. The results lead the authors to conclude that patients excluded from ‘pay-per-performance’ programs were less likely to reach the goals of treatment, while they are also more commonly from ethnic or disadvantaged groups; with this, the authors also concluded that allowing physicians to exclude patients can exacerbate health complications.

Education should now be considered to be an increasingly understood ‘factor’ in the treatment of diabetes, as well as the challenges in implementing the necessary understanding and isolating the causes which make it difficult to help an individual with type 2 diabetes. For example, Lackdar and Gill (2005) described aspects of

diabetic complications that are important to be addressed by education which is worth quoting at length since it has some very interesting findings within it:

“improvements in diabetes care and education for individuals with diabetes and their relatives in developing countries has reduced mortality rates from acute metabolic complications of diabetes to near Western standards. Examples include improved diabetes care in Soweto, South Africa, led to a reduction in mortality rates from hyperglycaemic emergencies from 25% to 10%. The mortality rate from diabetic ketoacidosis is reported as 2% in Libya, 3% in Tunisia, and 4% in Saudi Arabia whereas no deaths were recorded among 150 Kuwaiti children who presented with DKA” (Lackdar and Gill (2005).

Meanwhile, education programs in schools and awareness initiatives established through medical facilities or other organisations continue to attempt to improve understanding, but the details and scope of these programs vary greatly; there is no standard, even at regional levels, for informing children of the potential that they may have diabetes. However, general nutrition and health education that facilitate reduced chances for diabetes commonly mention the potential for it to manifest as a consequence of bad diet. Parents are also increasingly targeted with this information, as well as symptom and prevalence information amid the epidemic (Lackdar and Gill, 2005; IDF, 2012).

Studies in Medication

Studies focusing on medication provide a background of the developmental attempts and achievements in this specific area of treatment, which have revealed improvements in some areas but ‘lingering barriers’ for treatment in others.

Additionally, such studies have revealed trends in operations in the UK, shedding light on the nature of developmental trends, outcomes, and demands.

A recent study by Currie *et al.*, (2010) studied prescription behaviour in the UK from 2000 to 2008, using open source data from four UK pricing agencies. Changes in dispensing were assessed for diabetic patients, showing a rise in costs from £290 million to £591 million across the specified time span, i.e. 2000 - 2008. With their analysis, the authors found that all of the medication types used for reducing glucose levels (with the exception of alpha-glucoside inhibition and prandial regulations) exhibited a reduction in volume, while the cost of insulin alone rose from £128 million to £286 million.

The greater use of insulin may reflect the findings from the NAO (2012) that only 14% of patients had a routine check of their HbA1c levels and this low value may have resulted in more acute use of insulin to bring control back to acceptable levels.

Overall, the increase in cost for diabetic patients is asserted to be 7 percent of the **entire** NHS budget, while the authors concluded that changes were likely to be induced by commercial influences rather than clinical ones. Currie *et al.*, (2010) also concluded that dispensing patterns should also be better controlled to facilitate cost containment. In a related study, Hsia *et al.*, (2009) examined the rises in diabetic medication for young people in the UK, noting that increases had been observed in the US without comparable data for the UK. Acknowledging rises in both type 1 and 2 diabetes in the UK, but also acknowledging that more specific statistics are challenging to obtain (while the majority of statistics are only estimates anyhow), the authors aimed to estimate the rises in insulin and oral drugs between 1998 and 2005. This study found that medication use increases with patient age, considering a sample of 505,754 children, also concurring substantial and epidemic increases in both patient and medication quantities. Gale (2010) further concurred that medication costs have increased, with insulin prices rising 48.4 percent between 2000 and 2008; the author reported that opinions regarding routine use of the drug is needed in type 2 cases, asserting the majority of analysts feel this is only necessary for those who have actually experienced hypoglycaemia (and multiple times). Overall, these studies have shown that the changes to the medical system have not reduced the onset of diabetes, have not changed much in terms of outcome despite changes in treatment, while drug expenses per patient and overall continue to increase in the UK.

Complications of diabetes

Diabetic complications exist and are variable in their onset and outcome, but further illustrate the significance of the ‘diabetes epidemic’, which is highly relevant to the UK, in spite of the advanced state of its medical facilities and programs. According to the NAO (2012),

“People with diabetes are at significantly increased risk of serious health problems ... the overall life expectancy for people with type 1 diabetes is reduced on average by around 20 years and approximately ten years for people with type 2 diabetes. In January 2012, the Department of Health estimated that 24,000 of the

75,000 people that die each year with diabetes, die early from causes **that could have been avoided through managing their condition better** (I have added the bold characters)” (NAO, 2012)

With this, it is known that diabetes can damage both blood vessels and nerve cells, leading to deteriorations of the cardiovascular systems, eyes, feet, kidneys, and can exacerbate other conditions. As a consequence of such changes occurring, diabetics are up to five times more prone to strokes and heart attacks (Figure 7.3), and diabetes is the leading cause of ‘end-stage’ kidney disease or failure. Roughly half of foot amputations in the UK are for diabetics, while diabetes is the most common cause of blindness outside of the senior age group (NAO, 2012). The following figure presents the nature of other complications resulting from the onset of the disorder.

Estimated numbers of complications recorded by the 2009-10
National Diabetes Audit

Complication	Percentage of people in England recording complication	Percentage of people with diabetes recording complication	Number of people with diabetes with complication
Angina	0.64	3.13	60,500
Cardiac failure	0.39	1.58	30,400
Stroke	0.22	0.69	13,300
Myocardial Infarction (heart attack)	0.16	0.60	11,600
Ketoacidosis	0.02	0.48	9,200
Retinopathy treatment	0.03	0.42	8,000
End-stage kidney disease	0.08	0.38	7,400
Minor amputation	0.01	0.13	2,600
Major amputation	0.01	0.07	1,300

Figure 7.3: Diabetes complications in the UK (NAO, 2012)

The NAO (2012) further reported:

“the rates of diabetes-related complications, such as kidney disease, amputation and eye disease, are used as a measure of the final outcomes of care. With the exception of diabetic ketoacidosis ... the complications associated with diabetes can take a number of years to develop, and therefore indicate the quality of long-term care. Diabetes-related complications can lead to complex and costly treatment and significantly impact on quality of life” (NAO, 2012).

Meanwhile, ketoacidosis can cause potentially fatal complications, if not medically treated. In the UK, while the frequency of diabetes induced heart failure, eye disease, and amputation have been stable since 2004, the frequency of ketoacidosis and kidney failure have progressively increased. Recently, the American Diabetes Association (2012) reported statistics about complications increasing despite developed healthcare facilities for its treatments, reporting that 60 to 70 percent of patients have mild to severe forms of damage to their nervous systems.

Treatment of the condition in both Kuwait and UK includes diet control, exercise and home-based glucose monitoring. Additionally, a person should change their lifestyle, diet, and monitor their weight when diagnosed with type 2 diabetes. However, oral medications with or without insulin are recommended in some cases and 40% of diabetic patients may require insulin treatment at some time. Since diabetes is a progressive degenerative condition, medicines are introduced at an appropriate stage and then have to be used long term (Diabetes UK, 2010). These treatments include tablets, insulin injection or combination of both. According to Peyrot *et al.* (2005), insulin is not recommended as a first line of treatment in managing type 2 diabetes as it can result in early insulin resistance.

General information from the questionnaires.

The findings of the studies reported in this thesis have leant support for the published findings in the literature which have shown that diabetes is an increasingly major health problem in Kuwait. This study has resulted in a range of other very interesting findings that are not immediately apparent from the literature. One such finding was that some diabetic physicians in Kuwait still recommend insulin for initial treatment of type 2 diabetes. Furthermore, those patients who had been diagnosed with protein in the urine were not aware that they had renal problems because they were not informed what such findings actually meant.

The study considered findings in relation to the nationality, gender, weight, height, body mass index, current age of the patient, age of diagnosis, and the complications of a large patient group in Kuwait. These patients because they were randomly chosen from the 'mini clinics' not unsurprisingly include both Kuwait citizens and non-Kuwait citizens, both groups of whom were treated at the centers. Out of the total volunteers, 62 were Kuwaitis whereas 47 were non-Kuwaitis. Regardless of their nationality, females form the largest group of those diagnosed with diabetes.

The significant number of the type 2 patients were diagnosed in the age range 40 - 44 years accounting for 25.7% of those diagnosed. In this group, the average age at diagnosis was 41 for both citizens and non-citizens. This is the same as found by Al-Sultan & Al-Zanki, (2005). However, at the time of this study those over 60 years formed the largest number of diabetics (31.2%). This does agree with the findings of Al-Sultan & Al-Zanki, (2005), perhaps explainable by them using a different number of subjects between Kuwaiti and non-Kuwaiti. The findings of Abdella *et al.*, (1998) similarly found that more patients were found across the age range 20-59 than in any other age groups. On average, the Kuwaitis had survived with the disease for about 14 years from the time of diagnosis whereas for the non-Kuwaitis it was 9 years.

With a mean age of diagnosis at 41 years old, three assumptions can be made. The disease started earlier, diabetes is diagnosed more quickly, and/or the onset is earlier in Kuwait than other countries or the patients are referred to specialist clinics more quickly. These will be considered later.

Consideration of Body Mass Index values (BMI)

The observation that the patients mean body weight and BMI had reduced from the time of diagnosis, with men losing more weight than women could be attributed to diet modifications as well as exercise that promotes use of excess calories or perhaps it is just an inherent feature of the disease. The results show that by the time of diagnosis with type 2 diabetes, the majority was moderately obese, overweight, and severely obese accounting for 39.4%, 22.9% and 27.5% of the diabetic patients respectively. Very few people with normal and below normal weight developed type 2 diabetes (8.3% and 1.8% respectively). This finding suggests diabetes type 2 is directly linked to obesity and through appropriate lifestyle modifications it can be prevented (Klein *et al.* 2004) The prevalence of obesity in relation to diabetes in observed patients was in line with WHO (2006) BMI figures (Figure 7.4) For example in the results above the mean BMI for the group of the patients studied has for males $29.5 \pm 5.33 \text{ kg/m}^2$ and for females $32.3 \pm 5.19 \text{ kg/m}^2$. These results are very closely comparable to those of Al-Sultan & Al-Zanki, (2005) who found values of $27.8 \pm 6.3 \text{ kg/m}^2$ for men and $32.5 \pm 5.1 \text{ kg/m}^2$ for females. Clearly for both males and females the mean were in the zones of the overweight and obese.

This findings of the patients who participated in the study being either overweight or obese may reflect the dietary pattern of the subjects since obesity in general has been found to be especially prevalent in Kuwait due to the culture being less conducive to exercise, very high ambient temperatures, common car usage even for short distances, walking is very difficult due to temperatures, and gyms are very expensive in Kuwait. On one occasion on a visit to one of the diabetic clinics there was displayed a poster encouraging people to do exercise. One of the suggestions for diabetic patients was that they should bicycle for a period of time to reduce their body weight. What was not clear on the poster is how this could be done at summer temperatures of **more than** 45°C or how this was to accommodate the cultural limitations of ladies in Kuwait (see Appendix 12).

In addition, there is a practise to ingest large quantities of food with a high consumption of dates, afternoon naps, and even fast food eaten in the middle of the night. Furthermore high starch foodstuffs are staples of common meals for example rice, potatoes, bread and pasta many of which are often eaten in great quantities. A further complications, which is more likely in women than in men, is that the lifestyle of society expects that women will spend most of their time within their houses so decreasing their possible opportunities for physical activity is made even less likely by many families employing maids to carry out domestic duties.

As described in the literature review (Chapter One), dieting is typically regarded as relevant to diabetes if the patient is intentionally controlling their consumption of calories, or if they are following professional instructions in some other way in how the food they consume should be eaten. Awareness and initiatives to the described conducive elements of culture could serve to curb some of the problem. Dieting in this manner is considered beneficial in relation to diabetes, while the opposite level of consumption (poor eating habits) is generally considered to be somewhat conducive to complications in diabetes. This is aside from the inherent sugar consumption, while other factors promote a deterioration of health and exacerbation of diabetes onset or development. The health and exercise expressed by patients reflected either a lack of specific awareness, or a lack of motivation to achieving better health (even with the potential consequences in their diabetes.)

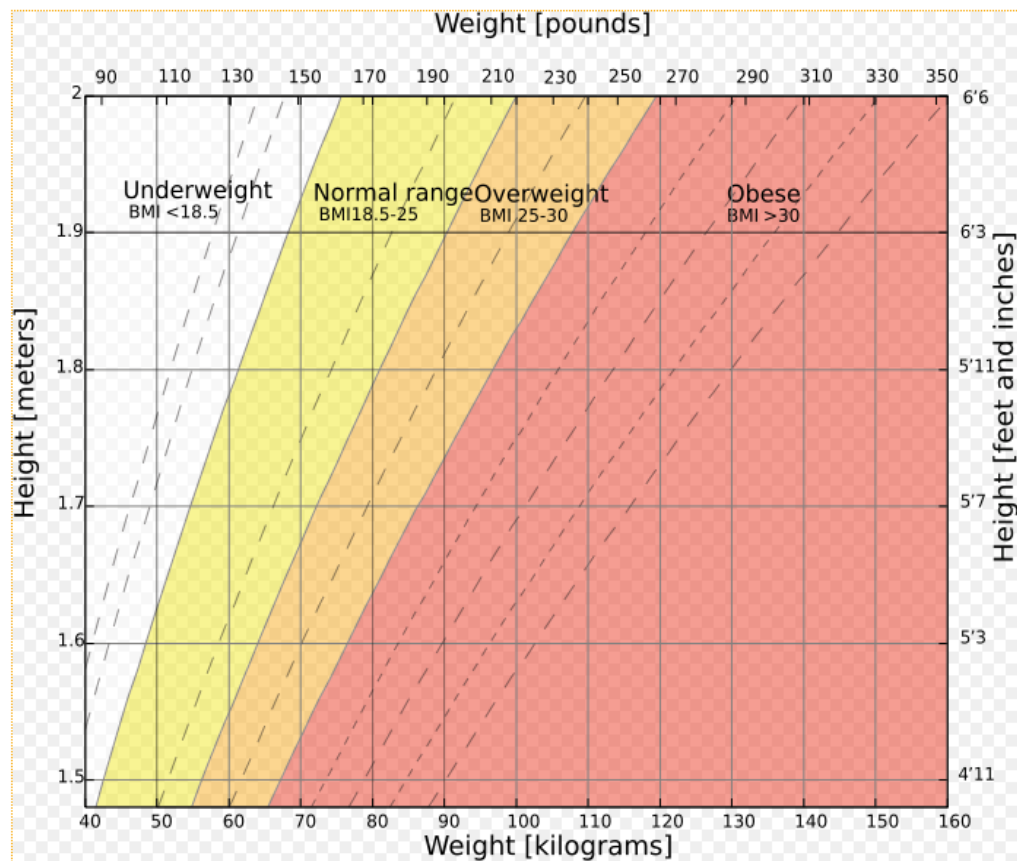


Figure 7.4: Body Mass Index Chart WHO (2006) (Public Domain)

Current state of type 2 diabetes management in Kuwait

Despite the existing guidelines or standards of care for diabetic patients, some diabetic physicians in Kuwait still recommend insulin for the initial treatment of this condition. It is true there may be some severe states in which this is necessary to bring about a very rapid and careful reduction of the blood sugar levels. However this cannot really apply to the number of patients in the sample who underwent this form of therapy. This non-adherence to standard guidelines does not only result in poor patient outcomes, can be potentially dangerous, induce a loss of insulin sensitivity and finally cause a greater loss of financial resources. It was most interesting to find that 9.2% (n=10) of the respondents had received insulin regimens as the first recommendation after their diagnosis.

Kuwait is not alone in suffering the complications of diabetes and other countries, including the UK, have also experienced high rates of diabetic complications. Suggestions have been made in the UK that these problems are made worse by the patients' lack of adequate education in managing their conditions, inadequate care

and support by the NHS professionals also contribute to this scenario (Hojat *et al*, 2011). In the data gathered in Kuwait for this thesis many of these same factors which affect the quality of care received by the diabetic patients was present in both countries.

Strategy for drug treatment in Type 2 Diabetes

Apart from the occasions where insulin was recommended as a first line of treatment, the majority of the patients were initially prescribed oral therapy, 72.6% of Kuwaitis and 81% of non-Kuwaitis. However, in some individuals, if oral medication was not effectively controlling their symptoms they were given insulin. At the time of this study, some of the patients had used insulin for less than one month .Despite the fact, that apparently more females than males used insulin to control diabetes, on analysis no significant difference in insulin use according to sex and nationality was found .

Synopsis of patient experiences of using insulin for the correction of Type 2 diabetes in Kuwait

There are two types of insulin misuse which were found in Kuwait. In this thesis, insulin was found to have been used as a first line of treatment for type 2 diabetic patients for 4 Kuwaiti and 6 non-Kuwaiti diabetic patients. One Kuwaiti patient mentioned that their physician prescribed insulin for her as a first line of treatment but she used it for 3 days only because she fainted as a result a severe low blood sugar.

The other three patients, at the time of the study, were still using insulin and they had all suffered from severe hypoglycemic episodes. One of them mentioned that he had had episodes where he lost consciousness as he was driving a motor car, the seriousness of which can be very easily understood.

One non- Kuwaiti patient, whose diabetes could not be in any way classified as being ‘critical’ mentioned that her physician prescribed insulin for her and was done for the convenience of once a day dosage. She used it for six months during which time she suffered convulsions due to her hypoglycemia, and after these episodes she spoke with her physician and he changed her medication to tablets. Another patient was dispensed a prescription of insulin and he stopped using it after 3 days because he

went into a coma. Another two patients had insulin prescribed for them and they stopped it after 2 days because they he went into coma. Two other patients still used insulin but they frequently suffered from periods of severe hypoglycemia

Surprisingly, all of these patients with this experience of insulin were not transferred from the physician to the dietician as would perhaps been expected.

Secondly, the diabetic physician replaced tablet medication with insulin with no reason

One of the examples is a Kuwaiti patient's physician prescribed for her insulin for a week and she suffered from severe hypoglycemia. After that she spoke with her physician and he changed it again to tablets. The original change to insulin had been done for the convenience of once a day dosage.

A second example is for a Kuwaiti patient who was taking oral hypoglycaemic medication. He visited the physician and when checked his blood glucose had increased to 144 mg/dl (8.0 mmol/L). No measurements of HbA1c were made at the time. His diabetic physician then prescribed for him insulin and he took it for 3 days. During this time he felt tired and he went to another physician who he told him that his blood glucose was not high and he didn't understand why the other physician prescribed insulin.

A third example is for a non- Kuwaiti who was taking oral medication who was then placed on insulin. During the first week of this treatment he went into a coma. After that episode the tablets were reinstated.

About 3.6% (n=3/109) of the respondents **their primary care doctor had replaced tablet medication with insulin with no reasons provided to the patient. A further 9.2% (n=10/109)** were put on insulin regimens as the first recommendation after their diagnosis. The example from Poland and the other example above, gives a cumulative total of total 12.8% (n=14/109) they used insulin against the guidelines.

In none of these cases were they ever referred to a dietician to aid in their insulin therapy.

The cases above highlight the problems experienced by both Kuwaiti and non-Kuwaiti patients who had been placed on insulin therapy. In the UK NICE has published guidelines on the correct use of this hormone which state:

The National Institute for Care and Excellence (NICE), an NHS organization, provides clinical guidelines when the diabetic patient uses Insulin **"When starting insulin therapy, use a structured programmed employing active insulin dose titration that encompasses: – structured education**

- continuing telephone support**
- frequent self-monitoring**
- dose titration to target**
- dietary understanding**
- management of hypoglycaemia**
- management of acute changes in plasma glucose control**
- support from an appropriately trained and experienced healthcare professional." (NICE, 2010)**

Surprisingly, all these conditions were simply not met in Kuwait. In fact one patient gave the following example of his treatment using insulin.

The patient was diagnosed as having a high blood sugar level. He was prescribed insulin, but not taught where or how to use it properly. He returned to the physician who when he checked the blood sugar and found it high stated that he was uncertain as to why the blood sugar even in the presence of insulin should be still too high.

This patient only found out by accident how to properly use insulin when he visited Polish hospital and somebody took the time and trouble to show him exactly where and how to use it. As a consequence of him using the insulin incorrectly his blood sugar was brought down to acceptable levels. Quite simply, simply because of poor understanding of the necessary technique, his blood glucose always remained high due to faulty technique and so dosage.

Insulin is a potent and effective way of controlling diabetes but special considerations need to be made. The standard insulin regimens must be tailored to individual patients and depend on: lifestyle, willingness to achieve the best control and ability to cope with injecting insulin and subsequent careful blood glucose

monitoring. The two types of insulin regimens used to control diabetes include mealtime plus basal regimen and the twice daily regimens (Ashwell *et al.*, 2006).

The mealtime regimen is the best for managing type 1 diabetes and mimics normal physiological insulin release more closely than other regimens. It requires meal time injection of insulin with fast-acting preparations preferably an analog (lispro/aspart) plus one or more injection of basal insulin (Ashwell *et al.*, 2006). The advantage of this regimen is that it offers the most flexibility in dosing and eating habits and provides better blood glucose control. It also has its disadvantages. It requires multiple injections that may go up to 5 times during the day and requires regular blood glucose monitoring, which many patients might not be able to achieve thus reducing compliance (Home & Kurtzhals, 2006).

In contrary, twice daily regimens are the alternative for those not able to manage meal time regimens. It uses re-mixed insulin of short- or rapid-acting plus intermediate-acting insulin. Currently, regular human insulin mixes and analog mixes are available for diabetes management. The regular human insulin combinations should be given 30 minutes before breakfast and 30 minutes before evening meals. On the other hand, analog mixes should be given immediately before meals because the analogs have a faster onset of action than the regular human insulin. Human and analog insulin are only available for parenteral administration. As an alternative inhaled insulin was developed and made available. However in practice it was less than successful and withdrawn. So, the subcutaneous route is still the major route used, and the site of injection includes the abdominal wall, buttocks, thighs and arm because they are readily accessible. The IV route of insulin can be used for special circumstances such as in the management of diabetic ketoacidosis, hyperosmolar states and patients who are due for surgery (De La Rosa *et al.*, 2008).

Treatment and Medication use

At their first diagnosis, the majority of the patients were prescribed tablets and then some (9.2%) moved to insulin. Single or combined medication were given with the highest number receiving metformin alone (n=35) and on a percentage basis this is equivalent to 57.1% and 42.9% for Kuwaiti and Non-Kuwaiti respectively.

Combined metformin and gliclazide (n=17) was in 47.1% and 52.9% for Kuwaiti and Non-Kuwaiti respectively. Metformin and glimepiride (n= 8) was 62.5% and 37.5%

for Kuwaiti and Non-Kuwaiti respectively. Other drugs and drug combinations were used less commonly for the management type 2 diabetes. It was also found that some Kuwaitis could control their condition with diet, whereas non-Kuwaitis could not. This is highlighted by the finding that out of the entire study group only 5 Kuwaiti patients, one male and four females were able to control their diabetes through diet alone.

The majority of patients received for their first line treatment 'tablet medication' 72.6% for Kuwaiti patients and 80.9% for non-Kuwaiti. In the group designated as the first line treatment of diet and exercise only, the figures were 1.6% Kuwaiti and 0% and non-Kuwaiti patients respectively. For diet alone the figures were 8.1% Kuwaiti and 0% non-Kuwaiti patients.

Consequently, in those patients where dietary control cannot effectively control their diabetes, then tablet medication(s) is recommended. This can be a single drug or a combination of various classes of drugs. It is imperative to note that exercise and proper diet still plays a significant role in disease management and, therefore, should form part of the management process. It is imperative to note that exercise and proper diet still plays a significant role in disease management and, therefore, should form part of the management process **to enhance 'seamless care' of patients condition.** However, insulin injections can be used if the current treatment fails to manage the condition (NICE , 2010). The NICE guidelines state very specifically the following criteria.

"• Provide individualised and ongoing nutritional advice from a healthcare professional with specific expertise and competencies in nutrition.

• When setting a target glycated haemoglobin (HbA1c): – involve the person in decisions about their individual HbA1c target level, which may be above that of 6.5% set for people with type 2 diabetes in general

– encourage the person to maintain their individual target unless the resulting side effects (including hypoglycaemia) or their efforts to achieve this impair their quality of life

– offer therapy (lifestyle and medication) to help achieve and maintain the HbA1c target level " (NICE, 2010)

In the Arab world and in Kuwait particularly there are many cooking methods and spices which produce high calorie food as the diet has been influenced by other diets including Iranian, Indian, and more recently the American 'diet'. The problem is complex as the gender and age of the diabetic person must be also taken into consideration when deciding on an adequate calorie intake. (Allawi, 1997)

What Should a Diabetic Person Eat?

A diabetic person living in the Arab world, and specifically in Kuwait, faces many challenges when it comes to choosing the correct diet. There are various food choices cooked by different methods and a diabetic has to make careful decisions about the type and quantity of food that is consumed. The organization of the meal quantities, types and timing are very important as are the age and the gender of the diabetic (Allawi, 1997).

Three Important dietary factors to be considered by the diabetic:

1. Meal Timing.

The type of meal suitable for a type 1 diabetic depends on their age and their working hours, and it is highly recommended that the meal is eaten 10-30 minutes after the insulin injection is taken. Patients that work at evening shifts get their main meal in the evening others that work from 8am -5pm get their main meal during the day.

In contrast, type 2 diabetic patients that use oral hypoglycaemics mainly focus on weight reduction and eating less food after 6 pm. The meals during this period focus more on vegetables and salads made with lemon and vinegar. Chicken, fish, or low fat meat can be eaten as also can eat fruits which is recommended due to their high fiber content which helps in digestion and contains high amounts of vitamins and other trace elements. (Allawi, 1997)

2. Type of Nutrition.

As discussed earlier there is no one, comprehensive specific diet for a diabetes patient as it depends on many factors such as the patient's gender, age, weight and working hours. The diet also depends on the treatment method (insulin injections or oral hypoglycemic tablets). Diets for diabetic patients can be classified into eight

main groups, within each group examples of food that the diabetic person should stay away from and examples of the replacements are also given. (Allawi, 1997) [See Table 1 in Appendix 13]

3. Quantity of food and fluid to be taken daily.

Nutritional advice is centred around calorie and vitamin and mineral intake. For example:

Proteins: (Animal and Plant) - each gram of proteins provides 4 calories

Carbohydrates: (sugar and flour) - each gram of carbohydrates provides 4 calories, alcohol provides 7 calories per gram

Fats: (Animal and Plant) - each gram of fats provides 9 calories.

Vitamins and Minerals - these are considered nutritional supplements that do not provide any calories, they are very important to the human body and misusing them leads to many health problems. (Allawi, 1997)

The tables in the Appendix 13 show the number of calories provided by the Arabic diet, for common types of Arabic appetizers such as Kubbah and stuffed vegetables, and Arabic main courses such as rice specialties, soups and deserts. A diabetic person living in the Arab world faces many dietary challenges as the majority of foods are cooked with either plant or animal fats. The majority of appetizers in Kuwait are either fried with oil or cooked with fats. Main courses include rice with chicken, meat or fish. Table 2 in Appendix 13 are important to consider by diabetes patients

Patients' knowledge of their diabetes, its management and complications.

The understanding of the patient about the condition, medications use and therapeutic outcomes can significantly improve the quality of care

" ... Offer structured education to every person and/or their carer at and around the time of diagnosis, with annual reinforcement and review. Inform people and their carers that structured education is an integral part of diabetes care. ...

"(NICE, 2010).

However, the majority of the patients in this thesis had a medium or low awareness of diabetes complications, plus they failed to monitor their blood sugar regularly and some could not even remember their medications name. Only 3.2% and 2.1% of Kuwaitis and non-Kuwaitis respectively had a high awareness of the complications of diabetes whereas the rest had a low or medium awareness. This lack of knowledge about diabetes is probably reflected by the results in which poor management with subsequent acute and chronic conditions was found. This is exemplified by the eye and renal problems of which they are unaware. According to Inzucchi *et al.*, (2012), **“hyperglycemia and hypertension are the two major controllable factors that influence development of diabetic complications, and they can be prevented if good management occurs from an early stage”**.

Diabetic emergencies can be either acute or long-term complications. The three acute emergencies of diabetes include hypoglycemia, diabetic ketoacidosis and hyperosmolar non-ketotic hyperglycemia. The chronic complications are broadly categorized into micro- and macrovascular depending on the blood vessels affected. Macrovascular complications are caused by damage due to atherosclerosis of the blood vessels that may lead to occlusion and /or platelet activation. The risks of macrovascular occlusion include cardiovascular disease(s) (CVDs) and peripheral vascular disease (PVD) (Deedwania & Srikanth, 2008). On the other hand, the microvascular complications include nephropathy, retinopathy, and neuropathy.

In a comprehensive study by Deedwania & Srikanth (2008) they state that CVDs are the most common cause of death in cases of type 2 diabetes mellitus and the risk is increased further if nephropathy is also present. Two common types of cardiovascular diseases in diabetes are coronary artery disease (CAD) and cerebrovascular illnesses or even stroke with women reporting higher cases of cardiac problems than males (Deedwania & Srikanth, 2008). In a earlier paper by Soedamah-Muthu *et al.*, (2006) they observed, that stroke caused a greater mortality and morbidity in diabetic patients as compared with the general population. Hypertension is also twice as common among diabetics as compared to the general population, and it affects over 80% of people with type 2 diabetes. Since hypertension is associated with macro and microvascular complications, its treatment target ranges are lower for diabetes (ACCORD Study Group, 2010). For people with type 2, hypertension is a feature of metabolic syndrome X, which is associated with

insulin resistance. However, for those with type 1, it is closely associated with retinopathy and renal disease (Alberti *et al.*, 2005).

Peripheral vascular diseases also affect the blood vessels of diabetics and affects the arteries of the legs and may give rise to a 'clumping pain' experienced in walking. This pain results from reversible skeletal muscle ischemia secondary to the atherosclerosis (Aulivola *et al.*, 2005). Affected iliac vessels can cause pain and also erectile dysfunction. It is vital to note that peripheral vascular disease increases the risk of cardiovascular disease and it is also associated with diabetic foot problems. Thus, better management of peripheral vascular conditions can significantly reduce or prevent the progression of cardiovascular disease.

Renal complications

The study found that 77.4% of Kuwaitis and 70.2% of non-Kuwaitis were aware of kidney complications, though they did not know the significance of the presence of protein in the urine. Most of the kidney problems had developed 2-3 years after their initial diagnosis. According the NICE guidelines the physician should discuss with patients about present of protein in the urine and he should mention for them about this complication, but in Kuwait this did not happen. The text of the NICE guidelines simple states: ... **"Discuss the significance of a finding of abnormal albumin excretion rate, and its trend over time, with the individual concerned"** (NICE, 2010).

The renal complications or nephropathies are microvascular complication of diabetes mellitus causing a reduction in glomerular filtration rate (GFR) and a loss of protein into the urine. The presence of nephropathy is indicated by the presence of a small amount of albumin in the urine (microalbuminuria). In higher amounts, it is referred to as proteinuria. This may progress to end-stage renal disease and so require dialysis. In order to avoid these effects, early diagnosis of nephropathy by measuring GFR is essential (Gross *et al.*, 2005). High blood pressure is a common risk of developing nephropathies, and in the study group, 69% of Kuwaitis and 61.7% of non-Kuwaitis had hypertension with **females** reporting a higher number of cases.

Drug usage

In addition to their anti-diabetic medications, 87% were aware of the antihypertensive drugs they were taking. The Kuwaitis could easily afford to treat their hypertension as they are covered by the comprehensive Kuwaiti health care system as opposed to non-Kuwaitis for whom cover is restricted to the drugs below a certain price and who could buy the necessary expensive medications if they wanted to, but due to their cost many did not do so. Tight control of both the glycemic levels and blood pressure significantly reduces the risk of developing nephropathy. In concurrent conditions of hypertension and nephropathy seen in type 2 diabetes, the treatment of choice is the angiotensin converting enzyme (ACE) inhibitors such as captopril or adrenergic blocking receptors (ABRs). They are the best medications because they have been shown to provide renal protective effect in addition to their antihypertensive effects (Rahman *et al.*, 2005).

Nerve complications

Only 17.7% of Kuwaitis and 14.9% of non-Kuwaitis patients were aware of the nerve complications or neuropathies. This was a surprising finding since diabetic peripheral neuropathies can lead to a broad range of sensory, motor and autonomic symptoms. The most common type of nerve complication is that known as the distal sensory type that is particularly evident in the feet. It manifests first of all as a loss of sensation that can progress to a complete loss of feeling. Painful diabetic neuropathy is another manifestation of sensation neuropathy which can be extremely disabling. Muscle pain is common and may require opiate analgesics (Mayo Clinic, 2015). On the other hand, autonomic neuropathy may affect any part of the sympathetic or parasympathetic nervous system commonly shown in man as diabetic impotence (Freeman, 2007). The neuropathies of the gastrointestinal tract result in digestive complications such as diabetic diarrhea which is common and can be troublesome as it tends to occur at night (Freeman, 2007). Freeman also states that gastroparesis may cause vomiting, and delayed gastrointestinal transit and variable food absorption causing difficulty in the insulin-treated patients. Consequently some of the study patients described some of the conditions listed above, such as stomach pain, without actual realising that they were describing nerve complications of their

diabetes. Only 15% were aware of this complications suggesting that there are profound educational requirements of the sufferers of diabetes in Kuwait.

Eye complications

Another serious and irreversible microvascular complication of diabetes is retinopathy. Blurred vision is a common problem in diabetes, and over 95% of the patients in this thesis were aware of this problem and 88.7% of Kuwaiti patients and 87.2% of the Non- Kuwaiti patients had this condition. Further, a decreased clarity of vision was a problem in 88.7% of Kuwaiti patients and 80.9% of the Non- Kuwaiti patients. From Table 4.61, 41.9% of Kuwaiti indicated that the specialist who conducted their eye examination was a diabetes specialist, while 58.1% indicated that the specialist who conducted their eye examination was a non-diabetes eye specialist. A value of 47.8% of non-Kuwaiti indicated that the specialist who conducted the eye examination was a diabetes specialist, while 52.2% indicated that the specialist who conducted the eye examination was a non-diabetes eye specialist. Most the eye specialists are in private hospitals. So most diabetic physicians did not examine patients' eyes, which is against NICE guidelines:

... " **Arrange or perform eye screening at or around the time of diagnosis. Arrange repeat of structured eye surveillance annually. Explain the reasons for, and success of, eye surveillance systems to the individual and ensure attendance is not reduced by ignorance of need or fear of outcome.**" ... (NICE, 2010)

This lack of eye examination is not due to a lack of suitable equipment or facilities since **all** the diabetic clinics in Kuwait contain a special room to check patients' eyes using a fundus camera. Surprisingly, many of these rooms were found to be locked and not used by the large majority of diabetic physicians. That this was the case has been established by information from the patients' files and also by what patients actual said had occurred. Furthermore, the ophthalmologists also said that this was the case.

Diabetic retinopathy is the leading cause of blindness in people less than 60 years of age (Mohamed *et al.*, 2007). It is symptomless until the disease is far advanced, and,

therefore, regular screening is required in diabetic patients for those found susceptible to this condition. ‘Tight’ glycemic control and blood pressure control reduce the risk of developing retinopathy. When it is detected early, the affected sites may be saved by laser photocoagulation. In advanced cases, more intensive types of surgery may be required (Chavala *et al.*, 2009).

Foot problems

Foot problems are also another common complication of diabetes, which the majority of the patients were aware of. They are often associated with particular problems of having diabetes such as sensory and autonomic neuropathy, peripheral vascular disease (PVD), and hyperglycemia. Poor foot care and poorly controlled diabetes are also contributory factors. Despite this well-known problem it was surprising that the feet of the majority of patients had not been examined on a regular basis. Fortunately, foot ulcers were 4.8% in Kuwaiti patients and 2.1% in non-Kuwaiti patients.

Female patients who had a foot problem did not know the reasons why, but one woman described the pain in her feet as ‘*like needles being inserted into the foot*’ especially after walking for either short or long distances. Another woman said that she had severing itching in both feet, which disturbed her ability to sleep and walking. In one far more severe case, a woman had had half of both feet amputated due to diabetes, thus making walking impossible so making her immobile. In addition, she also had ulcerated infected areas on her upper and lower legs which in Kuwait were going to be treated by amputation. However despite her difficulties the woman made her way Thailand where she was successfully treated without recourse to amputation.

From these patient experiences, diabetic foot complications can be devastating and diabetic foot ulcers are prone to infection, with the pathogens mostly implicated being *Staphylococci* and *Streptococci* with anaerobic microorganisms commonly infecting wounds with an ischemic component (Al Benwan *et al.*, 2012). These authors stated that infected diabetic foot ulcers account for the largest number of diabetes-related hospital stay and are the most common causes of non-trauma causes

of amputations. Proper patient education on foot care and management of wounds is essential to minimize the occurrence of diabetic foot ulcers.

Hypoglycemia and hyperglycemia

The patients also experienced acute complications such as hypoglycemia and hyperglycemia where 56.5% of Kuwaitis and 51% of non-Kuwaitis had experienced hypoglycemia with the warning signals of nausea, numbness, anxiety, dizziness and headache among others. It adversely affects the lifestyles of many patients, and if, not managed, it can be fatal.

In diabetes, hypoglycemia is defined as a blood sugar level of 3.5mmol/L or less (Diabetes UK, 2010). It can occur both in insulin treatment and oral hypoglycaemic agents especially the longer-acting sulfonylureas such as glibenclamide. It is caused when the doses of insulin and/or insulin oral secretagogues are increased (NICE, 2010) and with a reduced carbohydrate intake, increased exercise, and excessive alcohol consumption (Diabetes UK, 2010). Symptoms of hypoglycemia can be due to an effect on the autonomic system (caused by adrenaline) or neuroglycopenic effects that affect the brain. Autonomic symptoms are sweating, tremors, tachycardia, pallor, and hunger. Neurologic symptoms, on the other hand, include loss of concentration, drowsiness, confusion and coma (Mellitus, 2005).

Usually, the normal physiological response by the autonomic system to hypoglycemia is to alert the person to eat carbohydrates. Failure of an individual to act on these symptoms or if unaware may lead to further drop of blood glucose levels causing neuroglycopenic symptoms – which occurs when the brain is starved of glucose. At this time, the patient requires assistance to correct the hypoglycemia (Mellitus, 2005). In some cases, the patient loses the sensation to associate the symptoms produced by the autonomic nervous system and, therefore, is not ‘alerted’ so as to correct the hypoglycemia. This condition is known as hypoglycemia unawareness. It is a problem especially for those who are on insulin and may necessitate more frequent blood monitoring (Governor & Armstrong, 2015). The causes of hypoglycemia unawareness include long duration of diabetes, autonomic neuropathy, excessive alcohol consumption and other concurrent medications such as beta blockers. These drugs cause loss of adrenergic warning signs with the exception of sweating (Governor & Armstrong, 2015). Even though, they are not

contraindicated in diabetes, alternatives such as verapamil and diltiazem should be used if hypoglycemic unawareness becomes a problem (Governor & Armstrong, 2015). Hypoglycemia is treated by giving oral glucose to the patient who can swallow safely without the risk of aspiration. If this is not possible, parenteral treatment of either intravenous (IV) glucose or glucagon should be given.

Ketoacidosis

When asked about their knowledge of ketones and urine test for ketones, the majority of the patients did not know what these agents or the tests actually were. Fortunately, in this group of patients, ketoacidosis was rare. The reason for this is that diabetic ketoacidosis (DKA) is usually only a common occurrence of type 1 diabetes and is demonstrated by hyperglycemia and metabolic acidosis with the presence of ketones. In this condition the blood glucose level is usually more than 22 mmol/L. Since insulin is absent in type 1, the normal restraining effect on lipolysis is eliminated. As a result, the fatty acids are released into circulation for transport to the liver for the production of acetyl-CoA for production acetone, acetoacetate, and hydroxyglutarate. These compounds are then released into the circulation, and the patient's breath may have a fruity odor of acetone (Cotter *et al.*, 2013).

The hyperglycemia associated with DKA lowers plasma volume due to osmotic diuresis resulting in postural hypotension causing dizziness and weakness (Nugent, 2005). There is also an increased loss of potassium ions through urinary excretion causing further weakness. The produced ketones from the Krebs' cycle irritate the vomiting center in the brain, thus responsible for vomiting in diabetes. In addition, ketoacidosis exacerbates dehydration and hyperosmolality by producing anorexia, nausea and vomiting (Nugent, 2005). The rise in plasma osmolality causes impaired consciousness with coma in approximately 10% of the cases. In an attempt to restore acidosis, the metabolic acidosis stimulates the respiratory center giving rise to deep and rapid breathing (Cotter *et al.*, 2013).

The trigger factors of ketoacidosis in type 1 diabetes include 'omission' of insulin dose, acute infection, trauma and myocardial infarction (American Diabetes Association, 2008). DKA can be treated by fluid replacement, usually 0.9% normal saline, and for the correction of hyperglycemia and presence of ketones by infusing soluble insulin and prevention of hypokalemia due to loss of potassium ions. Apart

from hyperglycemia and metabolic acidosis, other tests for determining the extent of ketoacidosis include urinary electrolytes, arterial pO_2 and pCO_2 , arterial pH and bicarbonate ions (Nugent, 2005).

Another common type of acute diabetic complication is the hyperosmolar non-ketotic hyperglycemia (HONK) (American Diabetes Association, 2008). It occurs in type 2, especially in middle-aged and elderly people. In HONK there is no ketone production and, therefore, no severe acidosis. Hyperglycemia occurs gradually over time resulting in osmotic diuresis with subsequent dehydration. In severe cases, it leads to hyperosmolality that may increase blood viscosity and increase the risk of thromboembolism (Diabetes UK, 2010). The diagnostic features of HONK are hyperglycemia or glucose greater than 55.5 mmol/L, hyperosmolality, and mild metabolic acidosis. Successful treatment is fluid replacement to stabilize the blood pressure, which improves the circulation and urine output. Normal saline is given, and blood pressure is monitored. IV insulin is given but not 'aggressively' because fluid replacement is enough to lower plasma glucose level. Potassium may also be added if required (Jerreat, 2010)

Warning signals

The majority of the patients in this thesis had had warning signs of hyperglycemia: blurred vision, dizziness, drowsiness, dry mouth, fatigue, headache, hunger and frequent urination, increase of thirst, nausea, shivering, sweating, and increased body temperature. Additionally, the blood glucose level rises to 300mg/dl or more than 180mg/dl and heart beats increases.

These warning signals of hyperglycemia are due to the osmotic effects. Fatigue results from the inability of the cells to utilize glucose and produce energy (American Diabetes Association, 2008). As an alternative to energy source, proteins and fats are broken down resulting in weight loss. Blurred vision is a consequence of severe osmolality that may reduce intraocular pressure causing lenses deformity and visual disturbances (American Diabetes Association, 2008). Sometimes prodromal signs of a hyperglycemia crisis occur. A dry skin is also common, due to the dehydrating effect by osmotic diuresis (American Diabetes Association, 2008).

Glycosuria, the presence of glucose in urine, occurs when the blood glucose exceeds the renal threshold, and as a result, large quantities of glucose are excreted in the urine. Since glucose provides favorable growth medium for perianal microorganisms, diabetic patients are susceptible to the urinary tract infections (UTIs) (Geerlings, 2008).

Blood sugar monitoring

Monitoring blood glucose levels is an effective way of evaluating the diabetic state to ensure it is being controlled. According to Diabetes UK (2010), understanding the ranges of blood glucose level is useful in diagnosis and self-management of diabetes. The average blood sugar level is about 4mmol/L and immediately, after a meal it can temporarily shoot up to 7.8mmol/L. However, the regulatory controls restores blood glucose levels to a range of 4.4-6.1mmol/L. In type 2 diabetes the normal range of glucose is 4 – 7mmol/L (Diabetes UK, 2010). Most of the patients in this thesis did not know their blood sugar levels and only realized a drop when it reaches below 60mg or 3.3mmol/L – a potential risk for convulsions and comas. The study also found some patients had developed a diabetic coma and this had affected them to a significant extent. Some reported that they could not move, walk, do anything or even not check on their children and homes after going to a coma. In addition, they suffered drowsiness and nervousness; they always felt fatigued, weak, sleepy, angry, and more often, they had to take sick leave from their work.

These problems of low blood sugar reflect the failure of the patients to regularly monitor their blood sugar. A major finding and one to seriously worry about is that the majority of the patients had never checked their blood sugar within the last month, despite the fact that it can be done accurately and simply at home. There are several ways of monitoring blood sugar. Blood or urine test can be used at the doctor's office or home using test strips and meter. Even though, strips and meter can be used at home by the patients, most preferred visiting their doctors because they did not understand how to use them. Some patients had mentioned that they did not check their levels even though they all had meters because they were worried about what levels they would actually find in their blood. A further complication was that HbA1c levels were rarely measured which would have provided useful information for both the patient and the physician to optimise an individual's treatment. Clearly,

educational opportunities exist for the measurement and recording of blood glucose values.

Treatment guidelines and other similar studies

The international standards of diabetes management place a lot of emphasis on the provision of suitable patient advice on diet, exercise, weight loss and smoking cessation, if appropriate. However, the results of this study indicate that the majority of the patients were not in a weight management program, failed to do exercise as required and some were smokers as well as drinking alcohol. Only 3.2% of the Kuwaiti patients and none of the non-Kuwaitis were on a weight management program. In addition, there were many cases of preventable complications that increase the cost of the health care as well affecting the patient's quality of life. Failure of the physicians to comply with the clinical guidelines and the lack of patient awareness among the diabetic patients can be largely being blamed for all these outcomes. Other studies have also been done in Kuwait to evaluate how these factors have adversely impacted on the diabetes management in Kuwait.

Al-Adsani *et al.*, (2009) found out that the majority of patients failed to monitor their blood glucose levels and in addition, were not aware of their dietary requirements and self-management. These factors were attributed to illiteracy, old age, low income, smoking and negative family history of diabetes. They recommended educational programs that would empower those with low income and individual with low educational level to effectively manage their condition. Two year later, Awad (2011) conducted a study to determine how diabetic patients' knowledge influences the therapeutic goals and the factors associated with the correct knowledge. Their findings showed that lack of knowledge about the therapeutic goals, recent levels of blood pressure, low-density lipoprotein and glycated hemoglobin, (HbA_{1c}) was a challenge to the better management of diabetes. Thus, they recommended for the need of a multi-disciplinary team to provide patient education and encourage patient education and self-care.

The same year, Alshaheen *et al.*, (2011) studied how adherence to standards of care could influence the diabetes management and found out that compliance with standard practice of care significantly improved patient management outcome. This provides valuable information useful to both the medical staff and the patients when

evaluating their efforts on glycemic control and its complications. The authors used four treatment indicators to determine the compliance rates to the standard of care by both Kuwaitis and non-Kuwaitis type 2 diabetics. They studied the glycated hemoglobin (HbA_{1c}), low-density lipoprotein, microalbuminuria (MA), and fundus examination (FE). These indicators were measured at the beginning and the end of the study. They found that Kuwaitis had better control of their LDL than the non-Kuwaitis and that increased compliance significantly improved the outcome of the identified indicators, with microalbuminuria having the best control and the least being HbA_{1c}.

Kuwait Diabetes Society

Surprisingly, the data found in this thesis could not be reconciled with the aims and objectives of the Kuwait Diabetes Society. This organisation has a precise set of aims on its Web site but the evidence obtained from 109 patients these were never commented upon. They suggested that they provided many very useful facilities for the diabetic patients - low cost blood glucose meters and educational campaigns. Against this background none of the patients ever commented that they had used the services of this organisation, read their written material or used their screening capabilities for HbA_{1c} or eye tests. The Society also stated they ran courses for physicians which if they could be persuaded to attend such courses may improve both their theoretical knowledge and empathy with their patients. Also they may stimulated to complete patient files so ensuring all their patients receive a continuity of care which at the moment because the rudimentary data in the files is impossible to achieve.

Patient care

Patient involvement is crucial for the successful management and minimizing diabetic complications. Successful education depends on the individual patients and the availability of local resources. Individual education should start soon after diagnosis. Later, group training can be effective, and many patients appreciate and find support in meeting others who have the same disease. Not only patients should be educated but the involvement of the patient's family and caregivers is also essential. Patient education/ information should cover many areas of their condition including: the disease, its signs, symptoms, hyperglycemia and hypoglycemia (signs,

symptoms, and treatment). Knowledge and information about these topics would not only enable the patients to identify the complications but also manage them effectively whenever they arise. The need for exercise and its benefits and effect on blood glucose control should be stressed. Dietary advice should be of top priority highlighting foods rich in fats to avoid high cholesterol levels and the essential nature of dietary fiber.

For patients taking one or more of the oral hypoglycemic agents they require knowledge of the time to take their medications so avoiding the complications arising from failing to take the drugs at the right time. In addition, those on insulin therapy should be taught the correct injection techniques, how to store their insulin and to be aware of the onset and peak actions so enabling them to use insulin appropriately and monitor its effects. Home blood glucose testing is of significant importance when monitoring diabetes and patients should be made aware of the need for regular monitoring their blood sugar levels. Urine testing would help in identifying comorbidities such as kidney disease.

Foot problems are common in diabetes so appropriate foot care is essential in preparing patients on how to care for their foot such wearing appropriate foot ware and proper hygiene which could significantly reduce foot problems necessitating amputations.

They should be made aware of the cardiovascular risk factors such as smoking, hypertension and obesity. Avoiding smoking and controlling weight to prevent cardiovascular disease and the correct way to use their antihypertensive medications would be helpful. Regular medical and ophthalmological examinations is also critical to enable the doctor to identify any complications early enough to instigate the appropriate treatments so improving their prognosis.

Discussion of the open question answered by diabetic patients.

In the *Closing Remarks and Comments* section on the questionnaire was an open question to which the majority of the patients contributed some very useful ideas. As a way of an introduction to this section a few preliminary comments may be useful.

The responses from the diabetic patients clearly show that they felt that there were significant ‘treatment deficiencies’ existing in the management of their type 2

diabetes in Kuwait. These 'treatment deficiencies' included: a lack of enough knowledge about diabetes, its complications, and treatment by both the physicians and their patients. They thought this fundamental lack of knowledge adversely affected the nationwide management of their condition and in particular, the outcome to them, and the patients. It is upon their concerns that the following discussion focuses and on the challenges that affect diabetes treatment in Kuwait so as to be able to formulate a number of recommendations for the better management of type 2 diabetes in Kuwait.

The two major concerns of both the Kuwait and non-Kuwait patients were a) the lack of empathy among the caregivers and b) the inability of the physicians to use the fundus camera for an eye examination which are provided by the Ministry of Health in all the Diabetics Clinics. Both of these areas of concern the patients thought, showed a lack of crucial skills in the management of their diabetes. A similar viewpoint was expressed in a study by Hojat *et al.*, (2011), who strongly suggested that all physicians treating any disease including diabetes, should understand and share the patients' experiences as doctors' empathy significantly improves the clinical outcomes of the diabetic patients. They wrote:

"Patients of physicians with high empathy scores were significantly more likely to have good control of hemoglobin A1c (56%) than were patients of physicians with low empathy scores (40%, $P < .001$). Similarly, the proportion of patients with good LDL-C control was significantly higher for physicians with high empathy scores (59%) than physicians with low scores (44%, $P < .001$)" (Hojat *et al.*, 2011).

So patients in the Kuwaiti diabetic clinics, had caregivers which did not provide the needed compassionate care which may result in a poor prognosis because as Hojat *et al.*, (2011) have shown empathy significantly improves the clinical outcome of diabetic patients. This lack of empathy was more common in the Ministry of Health (MOH) clinics than in either the private hospitals or the Kuwait Oil Company (KOC) hospital.

One reason to account for this difference between the Ministry of Health Clinics and the private facilities may simply be that the number of patients a physician has to see in MOH clinics in a given time is vastly more than in the private medical facilities. Furthermore in the MOH clinics there are a limited number of specialist diabetic

physicians and each doctor sees a great many patients and there is simply not enough time necessary for creating good physician-patient relationship. When I attended such clinics to collect the data for this thesis, many of these clinics had to see approximately 70 patients in a morning session. These clinics are clearly therefore extremely busy.

As a result of the patients feeling that they have not received enough medical care, many patients opted to seek services in the expensive private hospitals where physicians were more caring about their patients and well medically specialized in the treatment of diabetes. Some patients claimed that they would collect their medication from a MOH Clinic (free of charge) and then see a doctor at a private hospital where payment is required. So although empathy is needed in diabetes care, perhaps sometimes it can go too far. In this thesis examples were cited when a patient requested a change of medication, based on the recommendation of a fellow diabetic, it was agreed to, which may have been inappropriate for that particular patient but was done simply to accommodate the patient's wishes.

The other major patient concern was the lack of eye tests. This important and justifiable concern for regular eye screening should be mandatory in the management of diabetic condition since it helps in preventing eye complications (Obrosova *et al.*, 2010). On the contrary, the results of this research revealed that most of the patients had neither been screened for eye problems by their diabetic physicians nor referred to an ophthalmologist for an eye examination. This perhaps reflects the possibility that the majority of the diabetic clinic physicians lacked or knew little about using a fundus camera to examine the eye, this despite every clinic having such a camera for their use. Consequently, this tool should be available and used by the primary diabetic doctor for eye exam before referring the patient to an eye specialist for further evaluation. In the UK, NICE clinical guidelines for the management of type 2 diabetes (NICE, 2014) recommends eye screening at around or at the time of the first diagnosis. It further recommends for repeated structured eye surveillance annually depending on the findings of the first diagnosis as well as referral to an ophthalmologist.

A third area of concern for many patients, perhaps not the same number as for empathy and eye monitoring, was the prescribing of drugs for their condition as

improperly prescribed medication were common. In most cases, these included medicines that were either ineffective in controlling diabetes or had adverse effects. They also failed to inform the patients of the type and purpose of their medications, thus falling short of the required healthcare standards and principles. For example, in addition to receiving drugs associated with allergies, some patients were put on unnecessary hypolipidemic drugs. They only came to know about their drug regimens when told by the pharmacists which shows the value of patients' understanding of their medications. Thus, the pharmacists could in the future play a critical educational role in diabetic management team because of their knowledge of the appropriate drugs.

A fourth area of concern, was although the patients knew that some blood tests were important and necessary for management of diabetes, most patients admitted that their blood levels for HbA_{1c} had not been monitored for a long time. HbA_{1c} levels are not recommended for diagnosis of the diabetic state because it takes a long time to form, that is three months (Cohen *et al.*, 2010), but it is useful in monitoring if blood glucose levels are controlled. It should be determined every two to six months until the blood glucose level is stable when it should be done at six-month intervals (NICE, 2014). In addition, rare or lack of blood analysis in diabetic patients' results in the development of otherwise preventable complications such as renal failure due to hyperlipidemia.

The final area of concern was about the correct diets of diabetics. Because of the role dietary control plays in diabetic management, a dietitian is an important member of the diabetes care team. However, some patients said they had not ever been referred to a dietitian which might be the cause of the poor eating habits in some patients as well as food and digestion problems. Other methods used by the patients for treatment of diabetes are use of a Chinese medicine costus and myrrh. Costus oil causes narrowing of the airways – an effect that lowers blood pressure, thus used in the management of hypertension in diabetic conditions. On the other hand, (Lotfy *et al.*, 2006) observed that myrrh can be used in the treatment of infected wounds in diabetic patients when combined with honey and bee propolis.

Clearly much remains to be done to satisfy patients concerns about their treatment.

7.2 Part B. Kidney Patients interviewed in Kuwait hospitals.

As has previously been explained, this chapter was used as a marker in term of poor quality of care of diabetes in Kuwait which causes severe complication such as kidney disease and that could have been avoided through managing the patient's condition better. The evidence of poor quality of care has been fully supported by the statements provided by the diabetic **patients** with final stage renal disease and their **physicians** during the interviews. The interviews conducted have suggested that many of the diabetic patients reached the final stage renal disease because the patients' diabetes is not well controlled by the primary care doctors. It was also observed that the **patients' notes**, which provide details about a patient's treatment, were incomplete and had little detail of patients' treatments.

As mentioned earlier , the treatment standards in the UK NHS are no different than Kuwait as only 14% of the patients in UK had HbA1c routine test and that will cause severe complications such kidney disease. About 7,400 people with end stage kidney disease in the UK due to diabetes (NAO, 2012). This requires dialysis and currently (2016) 20% of those receiving dialysis are diabetics (Kidney research.org.,2016)

The lack of a national kidney data records is a critical issue in the Gulf Cooperation Council (GCC). Available data does not provide accurate and updated estimates of the current situation. Additionally, given the growing burden of chronic kidney disease (CKD) confirmed in this thesis the importance of preventive strategies. Others have mentioned there is a need for more studies to describe the epidemiology of ESRD and to assess the overall quality of care of the kidney (Hassanien *et al.*, 2012). The prospective study by El-Reshaide *et al.*, (2005), on chronic renal disease in Kuwait, stated that 24% of patients with chronic renal failure had as their main etiological factor, diabetes mellitus.

This difference, between Kuwait and UK, may be due to the much higher prevalence of obesity among the population of MENA Region, higher than in the population of other region such as European Region. The change of lifestyle such as poor diet, poor physical activity and the absence of routine screening in younger people, and a

reduced awareness in these younger people could lead to an increase in both diabetes and impaired glucose tolerance. The same source suggests that early diagnosis is the key for diabetes in the MENA Region (Majeed *et al.*, 2014). The comparative prevalence in 2013 of diabetes mellitus according to the International Diabetes Federation (IDF) for Kuwait as compared with the UK was much higher 23.1 % and 4.92 % respectively (IDF, 2013). Most Kuwait patients may do not comply with the treatment and most of the patients may come very late. For all these reasons they may lead to severe complication such as renal failure.

So from the studies which have been conducted for this thesis the better use of HbA1c along with better glycaemic control and attempts to control hypertension and dyslipidemia plus greater empathy of the physicians and better education of the patients may help to overcome these problems.

The results of the questionnaire for aspects of kidney disease related to diabetes for all 79 patients who took part is given in Appendix 3, in the Hamed Al Essa and Mubarak Al-Kaber Hospitals, Kuwait provided some interesting findings. The questionnaires reveal patterns in those who have kidney disease, kidney dialysis and transplants, as regards to their diabetes, in terms of its diagnosis, relevant symptoms, medication, healthcare processes and overall treatment. This research seeks support to the primary aim of the thesis to investigate whether further research to improve diabetic care within the nation is necessary.

Body Mass Index calculations

Body Mass Index (BMI) calculation enables an optimal body weight for an individual to be suggested (Tchernof & Despres, 2005) And in this group 38% of the patients were overweight as their BMI was between 25 -30kg/m² and 27.8% were moderately obese as their current BMI was between 30-35 kg/m². The Kuwait diabetics had gained weight from their first diagnosis as their mean BMI rose from 29.9 (first diagnosis) to 31.1(currently). In contrast, the non-Kuwait patients lost weight, their average BMI of 33.0 first diagnosis falling to 31.5. However the position is complicated, as females gained weight, mean BMI of 32 (first diagnosis) to 33.4 at the time of the study, whereas men lost weight. The study also found that the percentage of Kuwaiti patients of average weight was much greater than that for

non-Kuwaiti (25.5% versus 8.3%), while the percentage of non-Kuwaiti patients who were severely obese was higher than for Kuwaiti (41.7% versus 25.5%).

Based on the population mean BMI (n=79), of 30.8(first diagnosis) and 31.2(currently), we can confidently conclude that the patients gained weight. It is interesting to note that despite the side effects of gaining weight, some researchers argue that the mortality of patients on hemodialysis increases with an increased BMI. However, according to my understanding it will depend on whether the increased BMI is due to gain in adipose tissue or muscle mass.

However, weight gain among the patients can predisposed them to nephrolithiasis. Insulin resistance is common in obese patients, through feedback mechanism the body produces more insulin leading to hyperinsulinemia, (Mariappan *et al.*, 2014) and this altered insulin sensitivity leads to mis- metabolism that finally leads to nephrolithiasis, formed especially from calcium oxalate. In addition to insulin resistance there is an altered ammonium ion production and this causes hypocitraturia which changes urinary pH linking in with an increase in body weight being inversely related to urinary pH. The total effect leads to defects in acid secretion by the kidney as hypocitraturia is directly linked to calcium nephrolithiasis. Weight gain may also lead to an increase in uric acid excretion and also oxalate due to a rise in endogenous oxalate metabolism. Kidney stones may cause painful micturition and haematuria(Shavit *et al.*, 2015).According to Abona & Samhan (2006), patients are advised to record their daily weight and blood pressure, especially if they are taking antihypertensive medication and visits their physician if they have gained more than one kilogram in a week. Such practice did not appear common with these patients, as there was a general lack of communication between physicians and patients. This should be encouraged to improve patient care.

Stage of kidney diseases.

The kidneys play a vital role in many body systems including the regulation of acid-base balance, excretion of urea, drugs, and fluid homeostasis. Additionally the kidneys also produce the hormone erythropoietin and actively participates in the metabolism of vitamin D, calcium and phosphorous. These functions are compromised when they are diseased and chronic kidney disease caused by structural

abnormalities leads to gradual failure to perform its vital roles. Complications developing from chronic kidney failure include; anemia, retinopathy, cardiovascular complications and bone disease. It is important for both the patient and physician to know the stage of their diseases to guide therapeutic interventions/supportive care. The finding that 87% of Kuwaiti patients, (24 males and 24 females) and 75% of non-Kuwaiti patients knew their stage of their kidney disease suggests communication between physician and patient is good.

The implications of patients not understanding the rationale behind clinical tests are serious, but the implications for patients who do not know whether the nature of their illness is chronic or acute are even more serious. 13 patients did not know the stage of their kidney disease and 14 patients they did not know what type of kidney disease they had. Such a lack of understanding makes it virtually impossible for patients to ensure they are taking the proper precautions and following the recommendations for diet, measurements, discussions with the physician, and clinical examinations from experts such as suggested by Abona & Samhan (2006) to understand the nature of disease progression.

Staging of CKD has clinical significance, guiding therapeutic interventions so enabling the control of symptoms and complications. Of the Kuwaiti patients studied 85.5% had chronic disease (23 males and 24 females) while 75% of non-Kuwaiti patients chronic renal illness (11 males and 7 females) and 14.5% and 25% of Kuwaiti and non-Kuwaiti patients simply did not know what type of kidney disease they had.

In 2002, the US National Kidney Foundation Kidney Disease Outcomes Quality Initiative guidelines (NKF KDOQI) used the glomerular filtration rate and other markers of kidney failure like albuminuria to classify CKD into 5 stages. Since then, some changes have been made on this classification by the Kidney Disease Improving Global Outcomes (KDIGO) organization. In the United Kingdom a Consensus Conference further divided stage 3 of the classification into A and B, depending on the level of drop in GFR (see below).

Table 7.2B.1 Stages of chronic kidney disease (KDIGO).

Stage	Description	GFR (ml/min/1.73 m ²)
1	Kidney damage with normal or raised GFR	≥90
2	Kidney damage with mild decrease in GFR	60-89
3A	Moderately lowered GFR, regardless of kidney damage	45-59
3B		30-44
4	Severely lowered GFR, regardless of kidney damage	15-29
5	Kidney failure (end-stage renal disease), regardless of kidney damage or kidney failure treated by dialysis or transplantation	<15

For stage 1 and 2 the presence of proteins (<1 gram per day) in urine may be evident. If the protein is more than >100 mg/mmol, a suffix p is added. The United Kingdom Consensus conference suggested 3A and 3B because most patients with GFR of 46-59 ml/min/1.73 m² were asymptomatic yet most of the patients with a GFR of below 45 had complications. Further, the conference also suggested it was necessary to find out what is causing CKD

Symptoms and **Medications**

The first phases of chronic kidney disease may be asymptomatic. Progressively, most patients begin feeling weak and tired, which can be attributed to the reduced erythropoietin production so reducing red cell formation causing anemia. In fact, 95% of Kuwait patients (26 males and 26 females) and 92% of non-Kuwaiti patients (13 males and 9 females) reported that kidney disease affected their daily lives. Due to poor renal function waste metabolic products accumulate which can affect the CNS (Mayo clinic, 2016). Such patients may experience nausea, anorexia, vomiting, mental slowness, seizures, hyperreflexia, encephalopathy,

and insomnia. Fluid homeostasis may be compromised causing edema in sites such as the ankle, pleural effusion, and in the lung i.e. pulmonary edema. Extra fluid in the lung and anemia may lead to dyspnoea. Patients also develop abnormal urination patterns, polyuria and nocturia. The patients in this study said kidney disease affected their diet (12.2%), influenced their work (14.9%), their social life (9.5%).

Hainsworth (2006) presented treatment guidelines for anaemia in kidney disease, stating that for erythropoietin:

“diagnostic evaluation and assessment of anaemia...management of anaemia...assessment and optimisation of erythropoiesis...monitoring treatment...As with other NICE guidance there is a significant emphasis on patient-centred care. This particularly focuses on treatment with erythropoiesis-stimulating agents so that patients are fully informed about the benefits and side-effects of such treatment and the consequences of poor concordance” (Hainsworth, 2006).

Management of CKD is critical in slowing down the progression of the condition, managing symptoms and complication (National Kidney Disease Education Program, 2014). Blood pressure should be regulated to <130/80 in case of proteinuria. In this thesis the patients admitted using tablets to manage their diabetes within the study 97.1% of patients reported that they were taking medication due to hypertension and 2.9% did not take any medication. Drugs such as angiotensin receptor blockers such as candesartan and angiotensin receptor antagonists such as captopril can be used. Beta blockers such as propranolol and calcium channel blockers such as verapamil can also be used. Management of hypertension not only slows disease progression but also reduces cardiovascular events associated with CKD. Diabetic patients should be monitored depending on the stage of CKD. Monitoring the hypoglycemic agents in stage 4 and 5 to ensure severe hypoglycemia does not occur. Drugs such as statins for example simvastatin can be used to lower cholesterol to reduce the cardiovascular risks (National Kidney Disease Education Program ,2014). Aspirin, an antiplatelet drug can as well be used. Non-pharmacological interventions such as diet and lifestyle modification can be helpful. Patients

should stop smoking, do frequent exercises to lose weight and to reduce the amount of salt they use per day. A renal transplant is the final 'choice' in case of end-stage kidney failure.

Anti-Diabetic Medications in Chronic Renal Disease patients

In this thesis the patients on the renal units had all taken oral hypoglycaemic medications for their type 2 diabetes but many were now receiving insulin as the primary treatment for their disease. In some cases they stopped both oral and insulin medications during renal dialysis. The majority of Kuwaiti males and females reported that they stopped taking tablet medication for their diabetes (89% and 83%) respectively, and for non- Kuwaiti patients 93% of males and 80% of females indicated that they were not taking any oral medications. The percentage of Kuwaitis males who were taking insulin for diabetes is greater than that for females (92% versus 80%). For non-Kuwaiti the percentage of males who were taking insulin for diabetes was less than that for females (91.7% versus 100%) respectively.

The patients in this group reflect the clinical finding that one of the leading causes of chronic renal disease which might progress to end stage renal disease is diabetes. The regulation of insulin levels is different in patients with and without renal disease. Around 50% of the pancreatic secreted insulin into the portal circulation is subjected to first pass metabolism by the liver. The kidney also plays a role in the normal metabolism of insulin. Therefore, exogenously administered insulin which is not subjected to first pass metabolism by the liver is primarily metabolized by the kidney (Madhu, 2011). However, when there is impairment of kidney function, the half-life of insulin is prolonged because of lower levels of overall degradation (Cavanaugh, 2007). Normally, insulin is filtered in the glomeruli and then extensively reabsorbed in the proximal tubules to be degraded by the tubular cells into amino acids which are reabsorbed; leading to only 1% of the filtered insulin appearing in the urine. In patients with renal disease, the elevated levels of basal insulin vary according to the stage of the renal disease and where renal blood flow is reduced then in the early stages causes an elevation. In the more severe cases, the loss of renal functional tissues mass can hinder the metabolism of insulin. For example in the most severe cases when the $GFR < 20$ ml/min a reduction of insulin clearance occurs in conjunction

with the decreased filtration. Such alteration in the degradation of exogenous insulin in renal- impaired diabetic patients leads to episodes of hypoglycemia (Madhu, 2011).

Another aspect of insulin physiology which is affected in patients with renal disease is their sensitivity of insulin. Usually, insulin sensitivity is decreased in diabetic patients with renal disease which is improved with hemodialysis. Thus after hemodialysis, patients experience hypoglycemic episodes since their sensitivity is improved. The fluctuation in insulin level and the consequent hypoglycemic effect occurs due to biphasic insulin metabolism. In the initial stages of renal disease, the insulin need increases as a result of increased insulin resistance and reduced insulin secretion. While in advanced stages of renal disease, the insulin requirements become less as a result of decreased insulin metabolism and clearance, in addition to reduced food consumption as a result of decreased appetite (e.g; anorexia) (Madhu, 2011).

Unfortunately, many hypoglycaemic agents have not been extensively studied in chronic kidney disease patients, so studies are awaited to conclude the safety and efficacy of oral hypoglycemic drugs in the presence of different degrees of renal impairment. Consequently, prescribing a hypoglycemic agent to renally impaired patient depends on the proper assessment of renal function, especially in fragile patients, as well as, renal function should be carefully and periodically followed during treatment to detect changes that may affect drug metabolism/excretion. Clearance of many drugs is decreased by kidney disease, and this results in prolonged exposure to higher levels of the drug or its metabolites and potentially leads to adverse side effects such as hypoglycemia (Cavanaugh, 2007).

In patients with chronic renal disease, the preferred drugs are those which undergo hepatic metabolism to avoid the renal excretory problems. However, if a drug is needed which is subject to renal metabolism then dose adjustment has to be practiced in a careful manner compatible with the patient's glomerular filtration rate. This is complicated as such dosage adjustment is mostly based on the pharmacokinetic assessments in chronic kidney disease patients, which

might be misleading, but they still offer as Bolignano has suggested, “a suitable, pragmatic solution in the absence of targeted studies”. (Bolignano *et al*, 2013).

Consequently, the oral hypoglycemic agents, especially first-generation sulfonylureas, should be either avoided or used in reduced doses for patients with chronic kidney disease since they are affected by renal function. Of the second-generation sulfonylureas, glipizide is recommended because its metabolites are not active and do not cause hypoglycemia. For α -glucosidase inhibitors and their metabolites, these may result in damage from a cumulative dose effect and result in possible hepatic damage, especially for patients with a serum creatinine > 2 mg/dl. (Cavanaugh, 2007). Metformin is contraindicated with even mild to moderate kidney disease in order to avoid lactic acidosis. In contrast the thiazolidinediones do not require dose adjustments since they undergoes hepatic metabolism and may have an independent beneficial impact on the progression of diabetic kidney disease.

Amylin is a neurohormone which is secreted along with insulin from the pancreatic β cells. Pramlintide is an amylin analog and although it is primarily excreted by the renal route, no dose adjustment is required in patients with moderate to severe renal disease (creatinine clearance 20-50 mL/min). There are no data available on the safety in patients on dialysis or with end-stage renal disease.

The two DPP-4 inhibitors Sitagliptin and Saxagliptin have a predominant renal excretion. Hence dose adjustments have to be made in patients with moderate to severe renal insufficiency. Insulin secretagogues, Repaglinide is a non-sulphonylurea insulin secretagogue which is extensively metabolized in the liver and excreted in the bile. Its half-life is around 0.6-1.8 hours. It is minimally excreted by the renal route; therefore, although the half-life of the drug is increased in patients with renal failure, there is no need for any dose modification in these patients (Cavanaugh, 2007).

Eye disease

Chronic kidney disease is an underlying cause of many organ complications including the eye. In this thesis 96% of Kuwaiti males 86% of Kuwaiti females

had their retinas examined, while for non-Kuwaitis, 93% for males and 100% for females respectively. However for their eye examination only 3.8% of Kuwaiti males and 0% of non-Kuwaiti males had their eyes examined by a specialist diabetic ophthalmologist. Similarly 0% of Kuwaiti females and 10% of non-Kuwaiti females had their eye tested by a diabetes specialist. In the eye conjunctival calcification and cataract occurs due to chronic kidney failure (Mayo clinic, 2013). As mention earlier, CKD causes alters calcium metabolism in the body and this malfunctions affects the eye.

Many of the patients in this study had had laser treatment for their eye disease. The findings that 78% and 68% of Kuwaiti males and females and 71% and 60.0% of non-Kuwaiti males and females had received laser treatment was perhaps surprising since specialist examination had not been performed.

However ,retinal hemorrhage may occur in CKD as a result of microvascular, macular degeneration and diabetic retinopathy and some inherited kidney diseases lead to retinal abnormalities such as Alport syndrome, retinitis pigmentosa and hereditary angiopathy. (Savige *et el*, 2011)

Similar to eye conditions renal problems can be familial and 27.3% and 16.7% of Kuwaiti and non- Kuwaiti patients said that they had a family history of kidney disease. The family member who suffered the condition were father (26.3%), mother (36.8%), brother (26.3%), father and mother and brother (5.3%), and uncle (5.3%) During development, the glomerular filtration barrier, and the inner retina share a developmental pathway, this means they share structural similarities like the epithelial cells and the basement membrane. Any inherited renal disease will thus have retinal features accompanying it (Savige *et al*, 2011). Kidney disease may cause cardiovascular disease, or it may be a consequence of heart disease. Most patients with kidney disease die because of cardiovascular complications. In CKD, there is anemia, fluid overload due to reduced glomerular filtration rate. Fluid overload may lead to pulmonary edema or pleural effusion leading to shortness of breath (Sarnak *et al* ,2003).

Kidney disease and its relationship with heart disease.

“Chronic kidney disease (CKD) is a major cause of cardiovascular morbidity and mortality all over the world ... CKD remains a major health problem,

causing cardiovascular diseases such as congestive cardiac failure, myocardial infarction, hypertension, stroke, and sudden cardiac death in patients with chronic renal failure (CRF)” (Ulas *et al.*, 2006)

When the kidney is diseased, fluid accumulates due to a disturbance of homeostasis. Blood volume increases which significantly increase cardiac preload - the amount of blood delivered to the heart through venous return, which influences the cardiac force during systole. An increase in preload causes an increase in the force of contraction, produced by greater heart contractility during ejection. To achieve this increased force overtime the heart may become hypertrophic adapting to its new ‘conditions’. In patients with pre-existing heart conditions, this may be both painful and fatal ((Ulas *et al.*, 2006). In this thesis, 58.2% of the Kuwaiti sample had cardiac problems, 18 males and 14 females, including chest pain (28.1%) and 71.9% had had a heart attack (n=23). For non-Kuwaitis 37.5%, 6 males and 3 were females had heart problems, 44% had chest pain and 56% had suffered a heart attack.

Hypertension is an immediate consequence of increased blood volume. When hypertension sets in as a result of kidney disease, it again worsens the not only kidney function but also the functioning of the heart and other organs. In some cases the heart cannot function normally leading to congestive heart failure (Sarnak *et al.*, 2003). Erythropoietin is a hormone that controls erythropoiesis, produced by the kidney. Chronic kidney disease leads to reduced level of erythropoietin leading to anemia. In these patients, cardiac output increases because the tissues are not getting enough oxygen but in the process the heart itself may become ischemic leading to angina. Left ventricular hypertrophy is an indicator of an overworking heart. (Sarnak *et al.* ,2003)

Diet and kidney disease

Dietary measures are among the common non-pharmacological approaches used in managing chronic kidney disease since some foods worsen the condition. 73% and 83% of Kuwaiti and non-Kuwaiti patients knew that if their kidneys were damaged they should avoid some foods. In this study, patients reports stopping using salt (13.3%) and potassium (18.3%). Those patients whom mentioned they avoided meals containing potassium as they had stopped eating bananas, oranges and tomatoes, but not other potassium containing foods like chocolate, lettuce, cucumber and nuts.

According to White (2012) patients should not eat a lot of fruits and vegetables since these foods contain a lot of potassium, accumulation of potassium in the body may lead to dysrhythmias. Most dairy products like milk and yogurt are a primary source of these electrolytes, so a limit on the use of dairy products to also control phosphorous levels can be useful. Two percent of patients reported they had stopped eating protein such as meat but not others food such as egg and milk, salt & potassium & protein (20%), salt & potassium (41.7%), the remaining 5% had different combination of these foods.

Patients with kidney disease and those with a kidney transplant should avoid using more than 2.5 grams of sodium per day so ensuring that their blood pressure is controlled by avoiding any fluid buildup. Foods low in cholesterol and the avoidance of very fatty foods including mono-unsaturated fatty acids (White *et al.*, 2012) are considered useful to reduce heart problems.

According to Abona and Samhan (2006), patients should be more mindful of diet, and discuss diet in more detail with their physicians; for example, sausage, canned and frozen food, fast food, cheese, spices, certain condiments, and salt should only be consumed with extreme caution and avoided wherever possible. Patients should also take more action to discuss their diet with their physicians as they complete the table demonstrated in Appendix 14, take note of diet for potential relationships with changes in condition, and be especially mindful of the relationship between salt and blood pressure.

As mentioned above, patients were surprisingly reluctant to follow the general recommendations for dietary adjustments, such as those provided by RenalInfo (2006) and Abona and Samhan (2006), while dietary measurements and testing were also surprisingly low. Although patients are recommended to take much greater action in adjusting their diets, their clinicians should play a greater helpful role in dietary communication, questioning, and organising a program for monitoring and measuring. According to EdRen (2011), the main sources of protein should be fish, cheese, eggs, milk, nuts, beans and soy products. It is also recommended that patients cut their salt intake to roughly half of the standard amount from 150-200 mmol per to only 80-100 mmol daily. EdRen (2011) clearly states that there is no specific 'renal diet,' while dietary advice may vary based on weight and other measurements (including the severity of complications).

More specific dietary recommendations, depending on the nature of complications, have been outlined by the sources discussed above, as well as a range of other experts including Stein & Wild (2002) and Suzuki & Kimmel (2007). Suzuki & Kimmel's (2007) research suggested that 90% of dialysis patients did not meet the daily nutrition recommendations, although they do not state the specific level of deviation. Considering the volume of literature available, there is no excuse for Kuwaiti doctors to allow this topic to be such a minor part of treatment, and ensuring that patients are fully informed and actively encouraged to follow dietary recommendations. Thirteen years ago, Stein & Wild (2002) pointed out that patients having received a transplant can generally step away from the strict precautions taken beforehand. However, they should be aware of the potential for increased cholesterol levels and weight gain associated with kidney transplants. EdRen (2011) outline a range of dietary precautions for a range of renal conditions, including **“excessive intake of protein must be avoided in CKD. Historically and on rare occasions a low protein diet has been advised for patients with renal failure ... their protein intake should be moderate - not high, not too low ... On haemodialysis a slightly higher protein intake is recommended ... On peritoneal dialysis a higher protein intake is recommended due to a small loss of protein from the dialysate”** EdRen (2011).

Dietary recommendations for the failing kidney and CKD emphasises a precise amount of protein, with either too little or too much resulting in negative consequences for the patient. Low protein levels can result in general malnutrition, while high levels of protein can result in increased blood acid, muscle breakdown, excessive phosphate intake, nausea and kidney damage. Consequently, protein supplements are not recommended as they may not be effectively processed while harming the patient (EdRen, 2011b). Hemodialysis patients are vulnerable to potassium and phosphate irregularities and higher rates of caloric utilization and so patients should slightly increase intake by up to 30-40 kcals/kilo of ideal body weight and take care not to consume too much potassium (levels can be examined via blood testing), and restrict (or take phosphate binders) phosphate intake or take phosphate binders (EdRen, 2011c).

Those patients that received a transplant must be mindful of the potential for increased weight gain and cholesterol both of which can lead to increased rates of heart disease, and generally only need to continue their restrictions for a short while after the transplant (Stein & Wild, 2002; Suzuki & Kimmel, 2007). After this, they should move to a healthy diet recommended for the average individual. However their antirejection medications can increase rates of infection, so whilst on these drugs, they should take great care to avoid raw foods and to wash hands prior to eating (EdRen, 2011d).

Renal dialysis

Renal dialysis, either hemodialysis or peritoneal dialysis, has associated risks. Of the dialysis patients, 46 were Kuwaiti (23 males, 23 females) and 18 were non-Kuwaiti (11 males, 7 females). These patients reported events such as hypotension (n=13, 20 %), anemia (n=6, 10%), cramps, nausea and headaches (n=3, 5%), infections (n=1, 2%), hypotension & other hypertension (n=1, 2%), while the remainder (n=40, 63%) were distributed in different groups of combinations of these types of renal dialysis. The problems may be caused by the drugs in dialysis or due to the altered pathophysiology during the process. Hemodialysis may cause sepsis, specifically bacteremia, which may occur if the equipment used or the dialysate fluid is contaminated.

Hypotension may occur during hemodialysis due to excessive ultrafiltration, presence of emboli in the blood vessel (thrombus formation) or due to anaphylaxis. The reduced blood supply can cause ischemia of the affected body organs like the fingers. Hypersensitivity can occur when a change of dialysis membranes is made (Lindsay *et al.*, 2004). Anticoagulants such as heparin are added to the dialysate, and this medication can cause bleeding. Older patients may experience dementia because of subsequent use of antacids containing aluminum or failure to remove aluminum from the dialysate water completely.

Peritoneal dialysis, on the other hand, poses problems such as bladder perforation if the catheter is blindly inserted. Peritonitis often occurs over time, especially in continuous ambulatory peritoneal dialysis (CAPD). Peritonitis can be diagnosed by checking the opacity of the drained fluid, due to increased level of leukocytes in the fluid (Agarwal *et al.*, 2013). Patients may also develop acquired cystic disease of the

kidney, those at increased risk develop hematuria two years after beginning dialysis, and the cysts may undergo malignant transformation.

Discussion of the open question answered by diabetic patients.

In this section a summary of the open question which was answered by the patients gives almost the same findings as in the previous section, so I will not discuss it in detail in this section.

Overall conclusion

This questionnaire survey revealed detailed information regarding the trends of kidney disease and transplants for patients in Kuwaiti clinics associated with diabetes. The results support the findings of the main study and literature, while facilities and employees need to improve to adequately meet patient needs in modern times. The failure to properly diagnose, explain, or treat the disease undoubtedly exacerbates the consequences of the challenges of this condition as it manifests within citizens. Although many elements show competence, the areas where it has not been shown particularly communication and diagnosis, do not meet the demands of the modern world, and therefore are in serious need of improvement.

7.3 Part C. Discussion of the physicians structured interview

Kuwaiti's physicians

It is well established that type 2 diabetes requires careful management to prevent its complications and ensure better treatment outcomes (American Diabetes Association, 2014). Due to numerous potential diabetic complications, its management requires a multi-disciplinary team of health professionals of different specializations. To optimize care, it should comprise a primary care doctor, ophthalmologist, podiatrist, doctor nephrologists, dentist, dietician, diabetes educator, pharmacist and a physiotherapist. By performing different roles, their combined efforts can achieve a single objective of improving treatment outcomes with the patient being the central focus. Since physicians play in a major role diabetes management, this part of thesis examined their opinions regarding the current standards of care in Kuwait.

All seven consultants, four nephrologists and three ophthalmologists freely provided their experience in diabetic management as well as their interactions with the patients which can be compared to the international standards of treatment of type 2 diabetes .

The Nephrologists' responses and recommendations

It is apparent from the results of the interviews, that diabetes management in Kuwait is problematic as all of them had met diabetic patients who had end-stage renal disease. They lamented that most of the cases were due to inadequately controlled blood sugar. They considered that the primary care doctors had failed to refer such patients to them for kidney examination, so ensuring early detection and treatment of kidney disease. The nephrologists attributed diabetes and hypertension as the leading causes of kidney disease and acknowledged that blood and urine tests should be done every six months if there are no problems and every three months in case of any renal abnormalities such as microalbuminuria. Additionally, they stated that the lack of symptoms in early kidney disease makes it very difficult for patients to know if they have poor renal function and only a limited number of their patients knew that kidney disease was a severe diabetic complication.

According to Levey *et al.*, (2011), the leading causes of kidney failure are type 2 diabetes and hypertension. Though, kidney damage can result from high blood pressure, renal failure can also be the cause of hypertension due to reduced fluid excretion (Levey & Coresh, 2012). The estimated glomerular filtration rate (eGFR) is

critical in the diagnosis of kidney disease and should be determined by creatinine clearance rate where in chronic illness it is less than 60ml/min in a period of three months. Urine tests check for the presence of protein albumin in the urine and normally there should be little or no protein present with high levels of creatinine. However, if more than 30 milligrams of albumin per gram of creatinine with or without reduced eGFR is present it is an indication of kidney disease.

The physicians' comment about seeing patients too late has been documented elsewhere and because nephropathy progression occurs over time, diabetic patients should be screened regularly for kidney disease. According to Bakris (2011), the ADA and the NIH recommend screening diabetic patients at least once a year.

For urinary excretion of albumin.

As the physicians said in their interviews early kidney disease is asymptomatic and if any symptoms are present they might be vague and nonspecific such as fatigue and general weakness (Bakris, 2011). However, as the disease gets worse they become more marked such as weight loss, loss of appetite, impaired thinking, fluid retention and anemia. From their experiences, the nephrologists recommended that diabetic doctors should work hand in hand with other specialists and get patients referred as early as possible to help avert or slow the progression of renal disease.

Ophthalmologists.

Similarly, the ophthalmologists recognized the need for team work because in many cases of ocular complications they have encountered these were due to lack of early patient referral for an eye examination. They said that diabetic patients should be screened for retinopathy every six months in the presence of existing retinal changes, every three months in mild or moderate changes and monthly in severe conditions. According to Duckworth *et al.*, (2009), individuals who are diagnosed for the first time with type 2 diabetes should be examined for eye complications by an ophthalmologist or optometrist. This determines whether the diabetes has been in progress for a very long time before diagnosis. In addition, the lack of symptoms during this period necessitates immediate examination after diagnosis. The results of the initial examination will determine the frequency of subsequent testing usually every one to two years after the first review (American Diabetes Association, 2014).

They also thought that all diabetic physicians should use a fundus camera, as provided in all the diabetes clinics in Kuwait, to examine the retina for microvascular complications of diabetes that requires regular eye examination (Vestergaard *et al.*, 2009). According to Fegghi *et al.*, (2011), blindness in diabetes results from a severe proliferative retinopathy. It may require treatment with laser surgery if medications prove ineffective. However, it is important to note that screening guidelines differ from patient to patient with the determinants being type and duration of diabetes and other life style factors.

If proliferative diabetic retinopathy is diagnosed then photocoagulation is usually effective in minimizing their growth. A very recent development to counter the effect of proliferative diabetic retinopathy has been to use vascular endothelial growth factor (VEGF) antagonists. The drugs are termed anti-vascular endothelial growth factor anti-VEGF and are asbevacizumab, ranibizumab and pegaptanib (Fegghi *et al.*, 2011) because they antagonize VEGF protein which triggers the growth of blood vessels in diabetic retinopathy. Their results were claimed to be most beneficial, but need further testing to ensure their effectiveness in the clinic.

Chapter 8

8. Conclusions

From all the results obtained for this thesis it can be concluded that type 2 diabetes is not effectively managed in Kuwait. There are three major reasons to be able to make this ‘hard statement’.

Firstly, the comments of the physicians in both Kuwait and Ascot (UK) illustrated clear deviations from the recommendations in the treatment guidelines of Kuwait which resulted in inadequate treatment outcomes among patients having type 2 diabetes in Kuwait. This is illustrated by failing to provide the necessary patient education that would improve patient self-care and in some cases they make treatment errors such as prescribing insulin as the initial treatment for type 2 diabetes.

Secondly, the great majority of patients said they lacked an adequate understanding of their condition as well as their treatment. As a result, their disease develops into preventable diabetic complications, because they fail to seek proper management when it is appropriate. In addition, the great majority thought that the healthcare professionals in Kuwait were not doing enough to control their diabetes and its subsequent complications.

Thirdly, from more severe cases of the disease or its complications of the patients and the physicians in Ascot, they felt that if their condition had been fully explained to them and this led to more intensive medical care that could have been avoided.

Chapter 9

9. Recommendations

This study has found that the patients journey in Kuwait lacks the ‘seamless approach’ which is required to produce integrated patient centred care. To ensure that the personal focus of care is always maintained an enhanced continuity of care could be established and so the disease burden caused by type 2 diabetes will be reduced. Also, the use of integrated care, strengthened by enhanced professional activity, will ensure the attainment of personal focused care.

Based on the data obtained for this thesis the following recommendations can be suggested to strengthen the role of primary care in Kuwait. Improve the care of type 2 diabetes in Kuwait.

Firstly, on behalf of the **patients** who were interviewed it is considered that the medical staff who treat type 2 diabetes should be encouraged to be more empathetic to their patients’ condition. This may require the training of existing family physicians and also looking to the future to produce more ‘indigenous’ medically qualified staff who could carry out this role. This should build in from the start of their careers the ethos of the continuity of care.

This is not an impossible request as the medical profession is an honorable, noble and humanitarian profession based on the ‘message of mercy’ which doctors usually practice with extreme precision. Doctors are required to understand the suffering of the patients who may not be able to easily bear the pain or to help those patients who do not have adequate information about their illness. A doctor is required to listen patiently and to be calm in all conditions, as well as handling the angry or impatient patient or who may ask lots of questions regarding their condition. It is then necessary for the doctor to treat all cases with an open mind and full understanding, as well as being compassionate, merciful and fair while dealing with others. This is because the patient is in need of someone who takes care of them in order to ease their pain and any concerns associated with their disease. The doctor has to treat the patient using good manners and to listen to the patient with a great degree of

understanding so as to try and relieve the patients' suffering and pain, so helping the patient to live with their condition. The Kuwait state, which provides very good facilities for the treatment of diabetes, should ensure their facilities are used to the full, so that no patient has to resort to private medical facilities to obtain adequate treatment. This will ensure a continuity of care is provided for all patients.

Secondly, the patient is perhaps the most important member of the team because other team members will rely on information from him/her. They participate in monitoring their blood sugar and inform their physician who regularly sees them for checkups or whenever they get sick. The primary care doctors should be informed of any changes in the care plan including the diet, medicines, exercise and any emerging illness because of his direct contact with the patient for extended periods of time. In addition, the patient should notify him of any presenting symptoms of the eye, nerves, kidney or cardiovascular conditions so as to enable him make a referral to a specialist whenever necessary.

Finally, the prevalence and increase of type 2 diabetes is posing a great challenge to the Health care system in Kuwait as is the case in many other countries. Most patients with type 2 diabetes are obese and type 2 diabetes rapidly increases with a rising incidence of obesity. Structures and systems can only achieve so much and the one major problem found in this thesis, namely "unhealthy food" in Kuwait has to be seriously addressed. More vigorous and widespread educational programs are urgently needed to encourage healthy eating, as well as to increase exercise and smoking cessation. One aspect of this education should be to try and explain to patients that 'jumping' from one provider to another to obtain what they consider to be adequate treatment should not be allowed as it greatly complicates their care.

Next on behalf of the **physicians** who were interviewed:

Firstly, the physicians should adhere to establishing and then using national and international treatment guidelines that are evidence-based. This practice would eliminate any poor practice and bias in diabetes management, thus making it easy to monitor and evaluate existing disease management programs or interventions and in the process making what is best termed 'seamless care'. Emphasis should be given to this to reduce the disease burden which diabetes causes for Kuwait.

Secondly, the NICE guidelines offer the best plan of care for the diabetic patient. They should have the opportunity to make decisions about their own treatment(s) and their care and working alongside integrated professionals to improve the clinical competence and patients' outcome. This could be explained using the document entitled 'Integrated and person focus care' which was released by the WHO in 2015. Physicians should take the 'patients story' as their baseline to improve the treatments. Physicians in Kuwaiti need to be far more diabetic patient centered who generally require a very high level of care to avoid the complications of their condition. In patient centered care, the patient has the right to information on the kind of treatment they receive and the various tests conducted on them the management of their type 2 diabetes. They should always be patient-centered with the individualization of therapies. This is necessary because of the numerous variations in factors for individual patients that may affect the treatment outcomes.

Thirdly, a multi-disciplinary team of health care professionals is required and they should take the leading role in monitoring the patient, counseling and education as it will significantly improve the treatment outcomes. The primary care doctors should work hand in hand with other healthcare professionals in the careful management and treatment of diabetes. Referral of patients within the KMOH system, may help to avert or slow the progression of severe diabetes complications such as the end-stage renal disease. This requires competent, knowledgeable doctors in the diabetic clinics so as to avoid overloading the hospitals services. This should reduce the overall cost of the service. The systems should involve the pharmacist in the diabetic clinics as one of the health care members of the team such as podiatrist, specialist nurses and other related professional groups. They could be very useful in assessing the effectiveness of the medication which is used for patients' treatment.

Fourthly, the cost of diabetes treatments in the world is, as compared with some other diseases, high including: the costs of medications, inpatient care, and outpatient care. However some of the changes that need the greatest improvement of the treatment of diabetes in Kuwait are not those which are the most expensive including: blood pressure tests, cholesterol tests, and blood test and checks and test the early signs of limb, eye, and kidney damage, to prevent any complications that leads to an increased cost of treatment . In the UK the NHS Health Check in patients aged 40 to 74 is used to establish whether they suffer from any treatable disease.

These tests are repeated every 5 years. In Kuwait in some patients type 2 diabetes starts in their 20's so it would be very useful for the MOH to insist on checking people from this age for early diagnosis and to prevent severe complications . Achievement of all these suggestions will decrease the total budget provided by the government.

Fifthly, there should also be provision of a comprehensive professional training and educational course for the physician and regular assessments by the peer physician and regular checks of the patients file by the Ministry of Health. There should be an educational program of human behavior for the physicians. For example, all prospective medical students should be interviewed before entering medicine school to examine his human behavior and potential care he would give to his patients. A simple fact to determine is how empathetic he is to his potential patients.

Sixthly, the strength of any care system is about ability of that system to provide a continuity of care. Family physicians provide a range of acute and chronic and preventive medical care services. In addition to diagnosing and treating diseases, they also offer preventive care, including routine testing, and evaluation of health risks, immunization and screening tests, and provide personalized advice on maintaining a healthy lifestyle.

Seventhly, In UK patients should not join to a private center without letter from the GP but in Kuwait they have different procedures and regulations the Ministry Of Health watch the work of the private hospitals but they do not have the right to prevent the patients to go to private hospitals. If the MOH provide qualified doctors this will led patients to refuse to go to private hospitals and the reason for that their health mange by qualified physician free of charge and they save their money. Also the MOH should enforce a rule like in the UK that the patients should not join to a private center without letter from the primary health center.

Finally, The Ministry of Health should interview diabetic patients in their diabetic clinics and ask them about their satisfaction with physicians' treatment. This would involve them discovering the true patients experience and this may help in

determining the actual physician competence in these clinics. **Also** more research should be done on the current methods of managing type 2 diabetes so as to validate their effectiveness.

This study has not only confirmed the harsh realities of type 2 diabetes in Kuwait, but has provided data for its improvement. Hopefully, some action can be taken to improve the situation through awareness and improvements for the people in Kuwait who are currently suffering this disease and for those in the future who will, very unfortunately be the statistics of tomorrow.

I also hope for a better health care in the future from the Ministry Of Health, especially because Kuwait is a rich country and can provide everything patients need. Physicians with better knowledge and better treatment will be a perfect support for these patients whom are fighting everyday just to survive and get ‘cured’.

These changes could be implemented it will be to the benefit of all type 2 diabetics in Kuwait. Surely a very desirable goal to achieve.

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11. Appendices

Appendix 1

Questionnaire introductory comments to the patients

Thank you for your participation, your comments are really appreciated. All your answers will be recorded in an anonymous way.

Study number Age (years) Sex 1) male ☐ 2) female ☐

Height m Body weight today.....kg and at this time of first diagnosis kg

Patient Questionnaire

1) Please state your age at the time of your original diabetes diagnosis: (years)

2) What course of action was recommended when you were first diagnosed? (you can tick more than one box) 1) none ☐ 2) tablets medication ☐ 3) dietary change ☐
4) exercise ☐ 5) actively to lose weight ☐ 6) other ☐ (please specify)
.....

3) Were you ever able to control your diabetes through diet alone?

1) Yes ☐ 2) No ☐ 3) I don't know ☐ If yes, please state the length of time (months)

Also what types of dietary advice did you find useful to achieve this control?
.....

4) Were you ever able to control your diabetes with tablets medication?

1) Yes ☐ 2) No ☐ 3) I don't know ☐

If yes, are you currently taking any of the following medications for your diabetes

1. Glucotrol (glipizide)	<input type="checkbox"/>
2. Micronase, Glynase, or Diabeta (glyburide)	<input type="checkbox"/>
3. Amaryl (glimepiride)	<input type="checkbox"/>
4. Tolinase (tolazamide)	<input type="checkbox"/>
5. Diabinese (chlorpropamide)	<input type="checkbox"/>
6. Glucophage (metformin)	<input type="checkbox"/>
7. Precose (acarbose)	<input type="checkbox"/>
8. Rezulin (troglitazone)	<input type="checkbox"/>
9. Prandin (repaglinide)	<input type="checkbox"/>
10. Other (please specify below):	<input type="checkbox"/>

5) Have you ever used insulin to control your diabetes?

1) Yes ☐ 2) No ☐ 3) I don't know ☐

If yes, please write the length of time (months) you took Insulin- months

Are you still taking insulin for your diabetes? 1) Yes ☐ 2) No ☐

6) What is your primary method for personally examining your blood-sugar level?
(please mark just one box)

1) blood or urine test (at the doctor's office only) ☐ 2) blood glucose test strips read by eye at home ☐ 3) urine glucose test strips at home ☐ 4) blood glucose read by strips and meter ☐ 5) none ☐

7) How often have you examined your blood sugar level in the past month? (please mark just one box)

1) never ☐ 2) once a week or less ☐ 3) roughly 2-6 times per week ☐
4) daily ☐ 5) twice a day or more ☐ 6) three times or more ☐

8) Have you undergone amputation of a toe, foot, part of a leg, or all of a leg for a poorly healing sore or poor circulation because of your diabetes? (please mark just one box)

a.) Yes ☐ b.) No ☐

9) How often, approximately, do you routinely visit your doctor for diabetes?

1) 5 or more times a year ☐ 2) 3 to 4 times a year ☐ 3) 1 or 2 times a year ☐
4) once per 1-2 years ☐ 5) once per 3-5 years ☐ 6) never ☐

10) What specific category of doctor do you visit for your diabetes?

1) general practitioner ☐ 2) diabetes specialist ☐ 3) both (GP and specialist) ☐
4) none ☐

11) During the past year has your doctor examined your feet?

1) Yes ☐ 2) No ☐ 3) I don't know ☐

12) Please tick the following for the amount of calories you should consume on a daily basis to maintain a healthy and safe body weight : a) 2000 or below ☐ b) 2500-3000 ☐

c) 2500-3000 ☐ d) 3000-4000 ☐ e) unsure of the actual total ☐ f) do not know ☐ g) other ☐

12a) Please state whether you are on a weight management program from a hospital dietitian 1) Yes ☐ 2) No ☐

13) Please fill in the appropriate box if you carry out any of the following type of exercise: a) walking for 10-30 minutes every day ☐ b) walking twice or three times a week for 10-30 minutes ☐ c) attending a gym for up to 30 minutes a day ☐ d) attending a gym for a session of up to 30 minutes a week. ☐ e) swimming twice or more a week for 10-30 minutes ☐ f) any other form of exercise. ☐ please state
.....

14) Which of the following complications of diabetes are you aware of? (you may tick more than one)

- 1) kidney problems ☐ 2) feet problems ☐ 3) nerve problems ☐ 4) eye problems ☐
5) digestive problems ☐ 6) other ☐ (please specify).....

Hypoglycemia

15) Have you ever had a low blood sugar 1) Yes ☐ 2) No ☐ 3) I don't know ☐

If yes how low does your blood sugar drop prior to noticing? a) 60 mg/dL ☐ b) 54 mg/dL ☐
c) 50 mg/dL ☐ d) other ☐

16) Were there warning signals? Yes ☐ No ☐ If yes, which of the following: 1) nausea ☐
2) numbness or tingling of the fingertips or lips ☐ 3) anxiety ☐ 4) dizziness ☐
5) headache ☐ 6) other ☐

17) For how many years you have been suffering any of these symptom?

- 1) 1-2 years ☐ 2) 2-3 years ☐ 3) 3-4 years ☐ 4) 4-5 years ☐ 5) 5 years or more ☐

18) Does hypoglycemia affect your lifestyle? 1) Yes ☐ 2) No ☐ If yes, please describe in what way

19) Have you had severe hypoglycemic spells in the past 5 years?

1. Yes ☐ 2. No ☐ 3. I don't know ☐ If Yes, which of the following 1) convulsions ☐
2) coma ☐ 3) heart problems ☐ 4) low body temperature ☐ 5) other ☐ ---

Please indicate number of events over the last five years: a) 1-2 times ☐ b) 2 -3 times ☐
c) 3-4 times ☐ d) 4-5 times ☐ e) 5 times or more ☐

Hyperglycemia

20) Do you test for urine for ketones? 1) Yes ☐ 2) No ☐ 3. Don't know what ketones are ☐

If Yes, please indicate how often you have been in ketoacidosis: 1) 1-2 times a year ☐

- 2) 2-3 times a year ☐ 3) 3-4 times a year ☐ 4) 4-5 times a year ☐ 5) 5 times or more a year ☐

21.) Were there warning signals due to hyperglycemia? 1) Yes ☐ 2) No ☐ If so, can you please write down what happened;

22) How many years has hyperglycemia been occurring?

- 1) 1-2 years ☐ 2) 2-3 years ☐ 3) 3-4 years ☐ 4) 4-5 years ☐ 5) 5 years or more ☐

Kidney

23) Have you ever been told by your doctor you have a kidney problem?

- 1) Yes ☐ 2) No ☐ 3. I don't know ☐ if so, please indicate the time since diagnosis;
1) 1 year ☐ 2) 2 years ☐ 3) 3 years ☐ 4) 4 years ☐ 5) other ☐ (please state).....

24) Have you been diagnosed as having protein in your urine? 1) Yes ☐ 2) No ☐ 3) I don't know ☐ . If yes did you transfer from diabetic physician to a nephrologists? 1) Yes ☐ 2) No ☐ 3. I don't know ☐

25) Do you require dialysis? 1) Yes ☐ 2) No ☐ 3) I don't know ☐

26) If yes to 25 then what is your dialysis schedule? Number of visit(s) per week; a) 1 ☐ b) 2 ☐ c) 3 ☐

27) Have you even had a kidney transplant? 1) Yes ☐ 2) No ☐

28) Do you have high blood pressure? 1) Yes ☐ 2) No ☐ 3) I don't know ☐

and if so, do you take medication for this reason? 1) Yes ☐ 2) No ☐ 3) I don't know ☐ , if yes please specify the name(s) of blood pressure tablet medication you took.....

Eye

29.) Have you ever had the back of your eyes (the retina) examined? (not including examination by an optician or optometrist just for glasses) 1) Yes ☐ 2) No ☐ 3) I cannot recall ☐ If yes who conducted the eye examination?

1) A general practitioner ☐ 2) A diabetes specialist ☐ 3) An eye specialist ☐ 4) I cannot recall ☐

30) How many times do you see eye doctor? 1) 1 per month ☐ 2) 1-2 per year ☐ 3) 2-3 per year ☐ 4) 3-4 per year ☐ 5) other ☐ 6) never ☐

31) Do you have diabetic blurred vision as a result of you diabetes? 1) Yes ☐ 2) No ☐ 3) I don't know ☐

32) Have you been diagnosed with a decreased in clearness of vision? 1) Yes ☐ 2) No ☐ 3. I don't know ☐

Nerves

33) Have you ever had foot problem? 1) Yes ☐ 2) No ☐

If yes, do you suffer from any of the following – (you can tick more than one)

1) Numbness or tingling ☐ 2) Burning or pain in feet ☐ 3) Foot ulcer ☐ 4) Other ☐

Circulation

34) Have you ever had heart problems? 1) Yes ☐ 2) No ☐ 3) I don't know ☐

If yes, is it 1) Chest pain ☐ 2) Heart attack ☐ 3) Other ☐

Lipids

35) Do you take any medication for high cholesterol? 1) Yes ☐ 2) No ☐ 3) I don't know ☐ **if yes, how long have you taken it?** a) 1 year ☐ b) 2 years ☐ c) 3 years ☐ d) 4 years ☐ e) other ☐ please state length of time

Lifestyle

36) Have you ever smoked cigarettes? (Check one box) 1) Yes ☐ 2) No ☐

If yes, when did you start smoking? 1) 1 year ☐ 2) 2 years ☐ 3) 3 years ☐ 4) 4 years ☐ 5) 5 years or more ☐

37) Do you drink alcohol? 1) Yes ☐ 2) No ☐ If yes, for how long have you drunk it?

1) 1 year ☐ 2) 2 years ☐ 3) 3 years ☐ 4) 4 years ☐ 5) 5 years or more ☐

Is the alcohol in the form of 1) beer ☐ 2) wine ☐ 3) spirits ☐

Do you have any comments to make regarding your condition, so that it may be used in medical research?.....

Thank you again for your participation, it is highly appreciated. For additional communication please contact: Eman Ahmed Buhajeel Email: E.A.A.Bu-Hajeel@brad.ac.uk

Appendix 2

Patient Questionnaire for the Ascot Rehabilitation - Introductory comments to the patients

Thank you for your participation, your comments are really appreciated. All your answers will be recorded in an anonymous way.

Study number Age (years) Sex 1) male ☐ 2) female ☐

Heightm Body weight today.....kg and at this time of first diagnosis kg

1) Please state your age at the time of your original diabetes diagnosis: (Years)

2) When did you first come to the UK for treatment? Months or years.

3) What is the primary reason you came to the UK for treatment?.....

4) Who pay the expenses of the treatments? 1) You ☐ 2) Sponsor ☐

5) How would you rate your treatment so far in the UK? Excellent ☐ Very good ☐
Good ☐ Average ☐ Poor ☐ Very poor ☐

6) What aspects of your treatment did you find were carried out here in the UK that were not done in Kuwait? Please specify.....

7) In which clinic in Kuwait did you receive you treatment?.....

8) What course of action was recommended when you were first diagnosed? (You can tick more than one box) 1) None ☐ 2) Tablets medication ☐ 3) Dietary change ☐

4) Exercise ☐ 5) Actively to lose weight ☐ 6) Other (please specify) ☐

9) Were you ever able to control your diabetes through diet alone?

1) Yes ☐ 2) No ☐ 3) I don't know ☐ If yes, please state the length of time,
(months) also what types of dietary advice did you find useful to achieve this control?
.....

10) Before you came to the UK were you on weight management program from the hospital dietitian? 1) Yes ☐ 2) No ☐

11) Please state whether you are on a weight management program from a hospital dietitian in UK? 1) Yes ☐ 2) No ☐

12) Were you ever able to control your diabetes with tablets medication?

1) Yes ☐ 2) No ☐ 3) I don't know ☐

If yes, are you currently taking any of the following medications for your diabetes?

1. Glucotrol (glipizide)	<input type="checkbox"/>
2. Micronase, Glynase, or Diabeta (glyburide)	<input type="checkbox"/>
3. Amaryl (glimepiride)	<input type="checkbox"/>
4. Tolinase (tolazamide)	<input type="checkbox"/>
5. Diabinese (chlorpropamide)	<input type="checkbox"/>

6. Glucophage (metformin)	<input type="checkbox"/>
7. Precose (acarbose)	<input type="checkbox"/>
8. Rezulin (troglitazone)	<input type="checkbox"/>
9. Prandin (repaglinide)	<input type="checkbox"/>
11. Other (please specify below):	<input type="checkbox"/>

13) Have you ever used insulin to control your diabetes?

1) Yes ☐ 2) No ☐ 3) I don't know ☐ If yes, please write the length of time (months) you took Insulin; months Are you still taking insulin for your diabetes? 1) Yes ☐ 2) No ☐

14) Have you had your medication changed by a doctor in the UK? 1) Yes ☐ 2) No ☐

If yes, do you now feel better due to the medication(s) change? 1) Yes ☐ 2) No ☐

15) How would you rate the empathy shown by the physicians and nurses in the UK to your condition

Excellent ☐ Very good ☐ Good ☐ Average ☐ Poor ☐ Very poor ☐

16) Is enough information about your day to day treatment provided for you in the UK?

Excellent ☐ Very good ☐ Good ☐ Average ☐ Poor ☐ Very poor ☐

17) Which of the following complications of diabetes are you aware of? (You may tick more than one)

1) kidney problems ☐ 2) feet problems ☐ 3) nerve problems ☐ 4) eye problems ☐
5) digestive problems ☐ 6) other ☐ (please specify).....

Kidney

18) Have you ever been told by your doctor in Kuwait you have a kidney problem?

1) Yes ☐ 2) No ☐ 3) I don't know ☐

If so, please indicate the time since diagnosis; 1) 1 year ☐ 2) 2 years ☐ 3) 3 years ☐ 4) 4 years ☐ 5) other ☐ please specify

19) Have you ever been told by your doctor in the UK you have a kidney problem?

1) Yes ☐ 2) No ☐ 3) I don't know ☐ if yes, please indicate the time since diagnosis; 1) 1 year ☐ 2) 2 years ☐ 3) 3 years ☐ 4) 4 years ☐ 5) other ☐ please specify.....

20) If yes to either 18 or 19 was this diagnose by protein being found in your urine?

1) Yes ☐ 2) No ☐ 3) I don't know ☐

If yes, to question 20 were you transferred from a physician to a nephrologists?

1) Yes ☐ 2) No ☐ 3) I don't know ☐

21) Do you require dialysis? 1) Yes ☐ 2) No ☐ 3) I don't know ☐

22) If yes to 21 then what is your dialysis schedule? Number of visit(s) per week;

a) 1 ☐ b) 2 ☐ c) 3 ☐

23) Have you even had a kidney transplant? 1) Yes ☐ 2) No ☐

24) Do you have high blood pressure? 1) Yes ☐ 2) No ☐ 3) I don't know ☐

And if so, do you take medication for this reason? 1) Yes 2) No 3) I don't know ☐
If yes, please specify the name(s) of blood pressure tablet medication you took?

Nerves

25) Have you ever had foot problems? 1) Yes ☐ 2) No ☐

If yes, do you suffer from any of the following – (you can tick more than one)

1) Numbness or tingling ☐ 2) Burning or pain in feet ☐ 3) Foot ulcer ☐ 4) Other ☐

Circulation

26) Have you ever had heart problems? 1) Yes ☐ 2) No ☐ 3) I don't know ☐

If yes, was it 1) Chest pain ☐ 2) Heart attack ☐ 3) Other ☐

Lipids

27) Do you take any medication for high cholesterol? 1) Yes ☐ 2) No ☐ 3) I don't know ☐
if yes, how long have you taken it?

1) 1 year ☐ 2) 2 years ☐ 3) 3 years ☐ 4) 4 years ☐ 5) other ☐

Lifestyle

28) Have you ever smoked cigarettes? (Check one box) 1) Yes ☐ 2) No ☐

If yes, how long ago did you start smoking? 1) 1 year ☐ 2) 2 years ☐ 3) 3 years ☐ 4) 4 years ☐ 5) 5 years or more ☐

29) Do you drink alcohol? 1) Yes ☐ 2) No ☐ If yes, how long have you drunk it?

1) 1 year ☐ 2) 2 years ☐ 3) 3 years ☐ 4) 4 years ☐ 5) 5 years or more ☐

In what form is the alcohol? 1) beer ☐ 2) wine ☐ 3) spirits ☐

Do you have any comments to make regarding your condition, so that it may be used in medical research?

Thank you again for your participation, it is highly appreciated. For additional communication please contact:

Eman Ahmed Buhajeel Email: E.A.A.Bu-Hajeel@brad.ac.uk

Appendix 2A

Summary of the findings in Ascot Rehab center:

- Represents the current age distribution of the patients who took part in the study in Ascot. 14.3% of the sample had an age are less than 40 years, while 21.4% of them were between 40 - 49 years, 35.7% of them were between 50 - 59 years, and the remaining four patients were above the age of 60 years (28.6%).
- The mean of body weight at first diagnosis for males was greater than that of body weight at the time of the study, 88.3 and 79.1Kg, respectively, while the mean of body weight at first diagnosis for females was less than that of body weight at the time of the study, 75.4 and 73.4 Kg, respectively. The means of body weight for males were greater than the means of body weight for females in the two scales.
- The BMI values were calculated and compared for the patients, using the paired Student's t test, they were 29.5 kg/m^2 (S.D. $\pm 4.6 \text{ kg/m}^2$) at first diagnosis and at the time of the study were 28.1 kg/m^2 (S.D. ± 4.1). Using the t-test results, we have no evidence against the null hypothesis, therefore, there is no significant difference was found ($p>0.05$) between BMI at their first diagnosis and at the time of the study.
- When descriptive statistics for this group of patients were calculated for **age at the time of their original diabetes diagnosis** it was found the mean of the ages was 38.5 years with standard deviation of ± 12.6 years. In terms of range, the minimum age was 23 years while the maximum was 65 years.
- That 64.4% of the sample members came to the UK for treatment in the year 2014, while 35.6% came in the year 2015. Moreover, all patients of the sample study (n=14) reported that the expenses of the treatments were paid by their sponsor.
- The majority of them considered that stroke was the primary reason, while 14.3% of the sample members reported that **cancer** was the reason, and 7.1% of them said that the **gangrene** was the reason.
- 85.7% of patients considered their treatment in the UK was 'Excellent', while 14.3% considered it as 'Very good'
- **Frequency distribution of clinics in Kuwait which provided treatment for the patients in the study.**

Clinic in Kuwait	Number	Percent
Al-Farwaniyah	1	7%
Al-Jahra	2	14%
Al-Qadisa	1	7%

Bayan	1	7%
Al-Fardose	1	7%
Al-Jaberriah	1	7%
Kefan	1	7%
Meshref	1	7%
Sabah al Salim	1	7%
Salmeia	1	7%
Salwa	2	14%
Total	14	100%

- In this table the clinics in bold letters are those which were used in the first part of the thesis, which included clinics chosen at random from Kuwait. The above distribution of patients and their clinics attended shows that 14% of the patients said that they receive their treatment in Al-Jahra Clinic and 14% in the Salwa Clinic. For the remainder respectively, 7% of them reported that they receive their treatment in the clinics which appear in the table above. It can be stated that the comments made by patients from clinics not included in the random sample studied in the first part of the thesis provides very similar experiences to those shown in the bigger study in Kuwait.
- In terms of percentages, 78.6% of patients said that the course of action which was recommended when they were first diagnosed was tablets medication, while for the remaining 21.4% the course recommended was to administer insulin. It was surprising to find that modifications to their diet, and increasing their levels of exercise, were never suggested.
- All of the sample patients in Ascot (n=14) reported that they were never able to control their diabetes through diet alone in Kuwait.
- All of the sample members (n=14) [100%] reported that before they came to the UK they **were not** on a weight management program from a hospital dietitian.
- All of the sample members (n=14) [100%] reported that **were** on weight management program from a hospital dietitian in the UK.
- All of males and females (n=14) reported that they had their medication changed by a doctor in the UK. When patients (males and females) were asked whether they feel better due to the medication(s) change, all of them answered positively. Additionally, all the males and females patients highly rated the empathy shown by both the physicians and nurses in the **UK** in regard to their condition as being 'Excellent', and also they gave 'Excellent' to the level of information about their day to day treatment provided for them in the UK.
- It is appropriate to mention that all the males and females studied reported that none of them had ever been told by their doctors in Kuwait that they had kidney problems.

- In contrast, when they came to the UK two males (22.2%) indicated that they were told by their doctors that they had a kidney problem; the other seven males did not have a problem. The diagnosis of the problem of two of the males since diagnosis was 4 months and 8 months. For the females, 3 were told in the UK had a problem with their kidneys, the times after diagnosis were one month, 4 months, and 8 months respectively. The two others did not have a problem.
- On further analysis, two males out of the 9 reported that their diagnose showed the presence of protein in their urine, while 77.8% of them (n=7) answered negatively. Among the group of females, 60% of them (n=3) indicated that diagnose showed the presence of protein in their urine, while 40% of them (n=2) answered negatively. In addition, both males and females who had been told by their doctors in the UK that they had a kidney problem pointed out that they were transferred from their UK physician to a UK nephrologist.
- We can mention in this regard, that for those patients with a renal problem none was severe enough to require dialysis, and none required a kidney transplant. For one man who came to the UK and then was assessed for renal function he had a value of 23%. On referral to a UK nephrologist the value progressively rose to 50%.
- 64.3% of patients said that they had high blood pressure, while 35.7% of them reported negatively. Among the patients who had high blood pressure (n=9), all of them pointed out that they took anti-hypertensive medication and 22% (n=2) of the patients took amlodipine tablets and three took lisinopril (Zestril). It is worth mentioning that four patients (44%) did not know the name of the tablet medication they took for hypertension.
- In a question about smoking, 50% of patients (n=7) reported that they had smoked cigarettes, while the rest answered in the negative. Among the patients who had smoked it was cigarettes for all of them (n=7) and they pointed out that they smoked cigarettes for a period of 5 years or more. Moreover, only one patient out of 14 (7%) indicated that he drinks alcohol; the remaining 93% did not. It is worth mentioning here, the patient who drank alcohol; it was in the form of spirits for 5 years or more.
- The **majority area** for concern of all Kuwaiti patients that the majority of the clinical workers did not have sufficiently developed skills or empathy in Kuwait. Doctors and Nurses were commonly wanting of not providing sufficient attention to patient problems, but the doctors and nurses in UK provide sufficient attention to patient's problems.
- The **second area** of concern of all Kuwaiti patients was that the effectiveness of treatment was considered to be either inadequate in terms of meeting patient desires, or even inadequate in terms of healthcare standards and principles

- The **third area** for concern of 7 Kuwaiti patients was that the primary care doctors in Kuwait did not measure the HbA_{1c}, and the HbA_{1c} was not done as a routine requirement of their treatment. However in UK they routinely measure the HbA_{1c} and some of them mention that they learnt what the HbA_{1c} is and why it is important for the diabetic patients, from their UK physician.
- the **fourth area** of concern of 6 patients was that the medication(s) which was prescribed by the physician in Kuwait may even be unsuitable for administration and did not actually work
- the **fifth area** of concern of 5 patients was that they have kidney complication due to diabetes and their physician did not mention that for them before they arrived in UK. They only found out about their condition on their admission to the hospital in the UK and for some patients their renal function was seriously low. For example one patients reported that his kidney 'work only 23%' and that dialysis was a likely treatment in the future. Some patients with their UK treatment knew their kidney function would be monitored.

Results from a pilot study in a UK hospital.

In any study collecting useful data to make the study more reliable is considered good practice. During the time this study was undertaken it was discovered that in a UK hospital, in Ascot, Berkshire, there was a rehabilitation centre (Rehab) to which the Kuwaiti government sent patients for care of their medical conditions. Amongst these patients were those suffering from the severe consequences of type 2 diabetes such a stroke or gangrene.

Every month Kuwait sends patients to UK for specialist medical care who are selected by a number of different Ministries, including: the Ministry of Health, the Ministry of Defence and the 'Cabinet' which oversees all the other ministries. Each of these organisation could send between 350-700 patients to the UK.

Consequently, the total minimum number which can be sent is 1050 (i.e. 350 x3) and as a maximum 2100 (700 x3). Not all these patients are diabetics with their complications, as some come for cancer treatment. In 2012 the Kuwaiti Ministry of Health sent 689 patients abroad per year for orthopedic and neurosurgery alone. All of these patients will have required rehabilitation, as Inpatients or Outpatients (Ascot Rehabilitation centre, 2015)

It is appreciated that this group is relatively small and suffering severe disease and could be thought of as a biased group on which to do analysis. Consequently it has

been included as an Appendix to the main study as being of scientific interest rather than being representative of the majority of patients in Kuwait.

On the encouragement of their medical staff and with full ethical approval 14 of their patients volunteered to be questioned using the same technique as was done in Kuwait. The aim was determine in a group of Kuwaiti subjects what had been their experiences of the treatment of their type 2 diabetes. This group had had the disease for an median 13.5years. Whilst it is true this group is very different from the study group in Kuwait, they had all been treated in the Kuwaiti system and so can give their perspective of their treatment over a longer time – to see if their treatment had changed over the years.

Background to the Ascot Rehabilitation Centre (Ascot Rehab).For readers not familiar with this centre the following description is provided.

A description of Ascot Rehab may be useful for the reader to understand the nature of the work of this unit. According to their published information material -

Ascot Rehab services are focused on reducing the negative effects of disability - specifically rehabilitating patients

(a)after musculoskeletal injury or surgery , (b)with traumatic brain injury (transport injuries) , (c) with neurological conditions , (d) post cerebrovascular accident , (e) post-spinal injuries and surgery , (f) with peripheral neuropathy.

Through improving the physical functionality and wellbeing of patients, Ascot Rehab clinical intervention post injury or event will improve their quality of life. The 20 bed Ascot Rehab Inpatient unit, with gym, therapy rooms and hydro pool will cater to inpatients and outpatients requiring specialised intensive rehabilitation. The average length of stay for inpatients is 10 weeks; therefore the total number of patients the unit could accommodate per year at an average fill of 90% capacity is 94 patients. Patients would receive an intensive rehab package consisting of an average of twenty sessions per week.

Outpatient therapy consists of individual sessions or intensive therapy packages (average ten therapy sessions per week) and accommodates (per year), approximately

- 208 physiotherapy patients having 6 sessions per week, for 6 weeks

- 191 occupational therapist patients having 3 sessions per week, for 6 weeks
- 104 speech and language therapist - patients having 1 session per week, for 6 weeks
- 26 psychology patients having 1 session per week, for 6 weeks

Physiotherapy sessions form the bulk of Outpatient provision as e.g.: musculoskeletal injuries tend not to require speech and language therapy or psychology input to the extent inpatient injuries do.

Discussion for the Kuwaiti diabetic patients' questionnaires in Ascot

From the research conducted, the majority of the patients (n=14) who sought medical attention in Ascot Rehabilitation, United Kingdom were between the ages of 50-59 years with very few being below 40 years. This reflects the age at which problems with diabetes are most commonly found perhaps complicated by their ability to carry out normal physical activities which as a result of less physical activities makes it difficult for the receptors to respond to insulin when it is produced (Bowman, 2008). Additionally, the age at the time of their first diagnosis varied, for the age ranges: 40-49 years, 30-39 years and 20-29 years, were represented by 28.6% each. The individuals who were diagnosed as having type 2 diabetes over 49 years of age was 14.2%. This indicates that the patients in Ascot were representative of those found in the part of the thesis concerned with the diabetic clinics in Kuwait

Rating of the patient experience of their treatment in the United Kingdom

Most patients who participated in this study considered the experience in the United Kingdom as “more excellent” as compared to their experience in Kuwait. Most of the patients thought that majority of the health practitioners in Kuwait “lacked sufficient empathy” or their skills to tackle diabetes and other related conditions were inadequate. The patients stressed that the nurses and the doctors in their home country failed to provide the attention needed to the challenges faced by them, their patients. This data confirms the findings made in the first part of this thesis when 109 patients were interviewed at diabetic clinics in Kuwait. In contrast, the medical staff – both their physicians and nurses in the United Kingdom had provided them with sufficient care and attention that they felt they needed .'' **a positive relationship between physicians' empathy and patients' clinical outcomes was confirmed,**

suggesting that physicians' empathy is an important factor associated with clinical competence and patient outcomes".(Hojat *et al.*,2011).

As a result of this better communication between them and the physicians and nurses the patients felt they were able to have a greater understanding about their condition(s) in the United Kingdom than was possible in Kuwait. Most of the patients who took part in the study believed that doctors in the United Kingdom showed sufficient empathy and developed skills in dealing with the diabetic conditions and complications in patients of all ages and severities. A large majority of the participants (72%) in the study stated that their experience of the medical care in the United Kingdom showed that medical staff had high level of empathy to them and their medical conditions as compared to their counterparts in Kuwait. This finding has also been made in 21% of the participants indicated that physicians' education and empathy in the United Kingdom was much better as compared to the education of the physicians in Kuwait when dealing with patients with diabetic cases.

This lack of empathy and attention to detail was described in the following way by 40 year old patient.

He raised concerns that the spread of cancer in his body was as a result of the carelessness of diabetic doctors. In Kuwait he was frequently prescribed creams for topical applications by his diabetes doctor for a back condition which progressively became worse and developed into him feeling continuous pain in the thigh. The pain continued and only after visiting a private clinic was he made aware that the source of his pain was due to a tumor that had developed in his back.

Most of the patients that participated in the study thought that Kuwait was a rich country with adequate medical facilities which are unfortunately being misused or mismanaged. Some patients quoted poor management of their medical conditions by the physician as resulting in paralysis. Diabetes is a major risk factor for the development of stroke, yet this risk is not understand or realized by diabetic patients. This is because, physicians, nurses and diabetes educators, are less equipped to educate diabetic patients. (Air *et al.*, 2007)

‘Ninety percent of physicians report discussing the risk of cardiovascular disease and the importance of prevention, although only one-half of patients

report their physician had discussed risk factor modification... Frequent and repeated patient advising regarding cardiovascular and cerebrovascular complications of diabetes and warning signs is necessary to improve utilization of primary and secondary prevention measures'. Air *et al.*, (2007)

Most of the patients who took part in the study believed that physician education and monitoring by the Ministry of Health would help to improve the quality of medical services in the country. Most of the patients travelled to the United Kingdom as a result of complications associated with diabetes such as gangrene, cancer and stroke. Complications of diabetes can occur when the disease is not properly diagnosed as quickly as it should be, so allowing the complications of the condition to progress untreated (Robab, 2011). Medical practitioners in Kuwait have therefore to improve their ability to achieve earlier diagnosis of diabetic conditions as well as management of the disease. Some 7% of the patients said that gangrene was one of the reasons they travelled to United Kingdom to seek medical attention, 79% of the research sample cited stroke while the remainder, 14% quoted cancer as the primary reason for them to travel to the United Kingdom to seek medical attention. In addition, 14% of the participants considered their treatment at the Ascot Rehabilitation Centre as very good with the remaining, 86% of the participants quoting their treatment as being excellent.

Aspect of treatment that is carried out in Ascot Rehabilitation Centre relative to diabetes.

When these Kuwaiti patients were admitted to Ascot **all** females and males (n=14) stated that their medications were changed by the clinicians in the UK. The medical practitioners were empathetic to the patient and provided information about the disease to their patients. Some patients applauded the practitioners in the UK for paying attention to most of their symptoms related to diabetes. Additionally, the physicians in Ascot Rehabilitation Centre suggested diet and weight management programs in the overall treatment of type 2 diabetes mellitus, something that was less likely to be suggested by the medical practitioners in Kuwait. The large majority of the patients (78.6%) had been prescribed in Kuwait, tablet medication as a remedy for dealing with diabetes with the remaining 21.4% being recommended for insulin

intake on their **first diagnosis** of the disease. Insulin was rarely used by the medical practitioners at the Ascot Rehabilitation Centre in the UK.

Consequently, due to the changes in medications of all the patients would suggests that the course of action that is taken by most of the health practitioners in Kuwait while dealing with the patients is against the NICE guidelines which does not recommend the use of insulin by the patient when they are first diagnosed with type 2 diabetes condition. The NICE guideline recommends clinicians to provide information about the disease to the patient before providing them with ongoing and individualized nutritional advice. These findings are very similar to those made in the first part of the study where insulin was recommended for the first line treatment.

The guidelines recommend the provision of the advice in a form that respects the needs of an individual's beliefs, culture and needs by being sensitive to the effects and willingness to change on their quality of life. In addition, the practitioners in Kuwait are not following the NICE guidelines as they have failed to emphasize advice on eating of balanced meals. A clinician should encourage eating of feeds with high-fiber content with sources of carbohydrates that have low-glycaemic index such as vegetables, fruits and whole grains (Jenkins, 2014). The clinicians are expected to possess competencies and expertise in nutrition (Loretsen & Bergstad, 2005). Instead, the clinicians have opted to give tablets and insulin to the patients when they are first diagnosed with insulin which is against the NICE guidelines (NICE, 2010).

A major finding was that all the patients (n=14) reported that in the UK they were able to control their diabetic condition through utilization of the diet alone. Moreover, 100% of the participants indicated that they were now on weight management programme as a remedy of dealing with their medical condition. Weight management was never considered as an alternative treatment by the clinicians in Kuwait. One of the most effective methods that individuals can utilize in the management type 2 diabetes is through paying attention to personal lifestyle. Unhealthy eating and lack of exercise have been reported as among the major causes of this type of diabetes. Lifestyle intervention is beneficial both before and after the development of diabetes. Many studies have demonstrated the importance of healthy diet, weight loss and regular exercise in people who have already been diagnosed

with such type of diabetes mellitus (Robab, 2011). Physical exercise is one of the main components of lifestyle modification that can assist an individual in controlling and preventing type 2 diabetes. Even dietary regimen may be significant in the initial phases of losing weight, exercise incorporation as part of weight loss programme to assist in the prevention of weight gain as well as maintaining weight loss (Jenkins 2014). The dietary program entails choosing foods that are low in fat, increasing consumption of high-fiber feeds as well as choosing of semi-skimmed and skimmed milk and low fat yoghurt (Allawi, 1997)

Weight management is vital in the control of type 2 diabetes as obesity is one of the diseases contributory factors. Physical activities such as muscle strengthening activities and moderate intensity aerobic activities such as walking and cycling are vital strategies for the management and control of diabetes (Okada, 2011). Continuous physical activities can favorably affect the sensitivity of the receptors to insulin hence improving the symptoms of diabetes.

Awareness of the complications associated with type 2 diabetes

On the awareness of the complications associated with type 2 diabetes, 21% of the patients or participants were only aware of the feet problem as a complication, 36% of the participants were aware of the kidney, feet and eye as a complication with the remaining 43% considering the eye and the feet as one of the complications.

Awareness about the kidney problems by the patients

It is appropriate to mention that all females and males who took part in the study reported that they had never been informed that kidney problems are a long term complication of type 2 diabetes. However, 22% of the male participants had been told by their physicians in the UK that they had kidney problems that were related to their diabetes. The diagnosis of their problem was rapid in the UK as a result of frequent checkups conducted by the medical staff. The majority of the male participants (78%) had no protein in their urine the remainder had protein in their urine. In addition, those individuals with renal changes were transferred to nephrologists in the UK, something that was not done with the medical practitioners in Kuwait. Fortunately, according to the nephrologists' report, all the patients with renal problems were not severe enough to require kidney transplant or dialysis.

The clinicians in the United Kingdom are specialized for effective medical care to their patients, unlike in Kuwait where clinicians are less specialized in their roles. The concerns of five of the patients were that their physicians in Kuwait failed to mention that they had developed kidney problems as a complication of diabetes. However, they were informed about it once they were admitted in the UK hospitals. Some of the patients realized that their kidney function had deteriorated and that their renal function was quite low. Two of the participants in the study noted that their kidneys “worked only for 23% and that dialysis was the only regimen in the future.

Discussion of the open question answered by diabetic patients in Ascot.

The Kuwaiti patients were concerned with the skills of the clinical workers in Kuwait, as they had not provided the quality services they expected for them as a diabetic patient. The manner in which complications, such as stroke and kidney had been addressed did not meet the required NICE guidelines.

Stroke that occurs due to cell death because of inadequate blood flow to the brain affects many diabetic patients. Stroke occurs in individuals with glucose intolerance, in both diagnosed and undiagnosed diabetes. Hyperglycemia leads to cerebral acidosis thus increasing the chances of stroke occurring in diabetic patients which may cause intracerebral and subarachnoid hemorrhage. Ischemic stroke mainly occurs due to oxygen starvation of the brain. (Cade, 2008)

Kidney complications are also common in diabetic patients, but the manner in which they were managed in Kuwaiti does not meet the required standards as physicians should carry out kidney function tests in order to curb such complications at an early age as early reduces the risk of developing cardiovascular diseases. (Allawi, 1997)

The UK physicians were stated by the patients to have more empathy and clinical skills. One of the patients reported they considered they had suffered more as a result of the Kuwaiti system which almost amounted to neglect. Another patient suggested that cancer had spread in his body due to poor care as she had often complained to the doctor about feeling some numbness and burning in the foot while the doctor continued issuing medication without conducting any checkups. He prescribed topical creams to be applied on the legs. His condition became worse, and he sought advice from a private hospital which found that the cause of the pain in the leg was due to tumors he had on her back." **A positive patient-physician relationship is a**

critical element in the practice of medicine and in the art of healing." Hojat *et al.*,2002). Some Studies have shown that diabetes increased the risk for different forms of cancer. Insulin resistance is common in obese patients, through feedback mechanism the body produces more insulin leading to hyperinsulinemia .Hyperinsulinemia can encourage the growth of tumors. Obesity is associated with increased risks of different types of cancer such as kidney and breast cancer. The risks of presence cancers are doubled by the type 2 diabetes patients such as liver cancer, pancreatic cancer and breast cancer (Diabetes UK, 2016).

The Kuwaiti patients were concerned that treatment did not meeting their expectations. For example, physiotherapy treatments in Kuwaiti are used but and most patients considered that this did not allow them to overcome some of their difficulties arising due to diabetes in the microvasculature. In the UK they found that physiotherapy was more actively used which enabled patients to move and walk, even after their short-term treatment.

"Physical therapists will play an important role in the care of people with diabetes because numerous interventions provided by physical therapists (such as therapeutic exercise) can assist in alleviating symptoms, slow the metabolic progression to overt type 2 DM, and reduce morbidity and mortality associated with these complications" (Cade, 2008)

One point mentioned by the majority of the patients was that in Kuwait the physicians never measured their HbA_{1C}, which elsewhere in the world is a routine requirement for diabetic patients (Day, 2001). Their treatment in UK required physicians to frequently measure patients HbA_{1C} and also to give an explanation to their patients as to why they were conducting such tests on them and the significance of performing the test.

The patients from Kuwait also raised concerns about the kinds of medications they were prescribed in Kuwait. Some they thought were inappropriate as they were not helpful to their condition. For example, one hypertensive patient was given an injection to lower their blood pressure which had been checked using a blood pressure meter. The effects were a profound hypotension. The patient's brother commented to the physician that the manometer was not working well. The physician checked and found that the manometer was not working well, so he considered

giving the patient another medication to restore his blood pressure but instead the patient was taken to ICU in order to counter the effect the first drug had on him.

The issue of diabetic kidney complications was also a concern for the patients. In Kuwaiti doctors never mentioned to them their kidney complication and some of only realized their condition after coming to the UK. In some patients their renal function was such that they ought to have been receiving medication but whilst in the UK they perceived that their treatment was much better and knew their kidney function would be checked. Physicians play an important role in managing patients with chronic kidney disease by regular assessment and providing them with medical care and support during all stages of kidney disease. Communication between patients, pharmacists, dietitians and physicians provides the best care for patients with chronic kidney disease (Weber *et al.*, 2008).

Appendix 3

Questionnaire introductory comments to the patients with Kidney disease

Thank you for your participation, your comments are really appreciated. All your answers will be recorded in an anonymous way.

Nationality **Kuwaiti** ☐ **non Kuwaiti** ☐ Study number..... Age (years)

Sex 1) Male ☐ 2)Female ☐ Heightm Body weight today.....kg

Questionnaire Diabetes

1. Do you have diabetes? 1) Yes ☐ 2) No ☐

2. What your body weight at the time of first diagnosis kg

3. Please state your age at the time of your original diabetes diagnosis: (years)

4. Were you ever able to control your diabetes with tablets medication? 1) Yes ☐

2) No ☐ 3) I don't know ☐ if yes please specify the name(s) of tablet medication you took?

5. How many years did you take it? a) less than 1 year ☐ b) 1-3 years ☐ c) 3-5 years ☐ d) more than 5 years ☐ e) other ☐

6. Are you still taking tablet medication for your diabetes? 1) Yes ☐ 2) No ☐

7. Have you ever used insulin to control your diabetes? 1) Yes ☐ 2) No ☐ 3) I don't know ☐ If yes, please write the length of time you took Insulindays/weeks

8. Are you still taking insulin for your diabetes? 1) Yes ☐ 2) No ☐

9. Please state whether you are on program from a hospital dietitian? 1) Yes ☐ 2) No ☐

10. How often have you examined your blood sugar level in the past month? (please mark just one box) 1) never ☐ 2) once a week or less ☐ 3) roughly 2-6 times per week ☐ 4) daily ☐ 5) twice a day or more ☐ 6) three times or more ☐

11. Have you ever had a low blood sugar? 1) Yes ☐ 2) No ☐ 3) I don't know ☐

12. Have you ever had a high blood sugar? 1) Yes ☐ 2) No ☐ 3) I don't know ☐

13. Do you test for urine for ketones? 1) Yes ☐ 2) No ☐ 3) I don't know what ketones are ☐ If Yes, please indicate how often you have been in ketoacidosis 1) 1-2 times a year ☐

2) 2-3 times a year ☐ 3) 3-4 times a year ☐ 4) 4-5 times a year ☐ 5) 5 times or more a year ☐

Blood pressure

14. Do you have high blood pressure?

1) Yes ☐ 2) No ☐ 3) I don't know ☐ **and if so, do you take medication for this reason?** 1) Yes ☐ 2) No ☐ 3) I don't know ☐ **if yes please specify the name(s) of blood pressure tablet medication you take.....**

15. How often you check your blood pressure checked ?

1) Weekly ☐ 2) Weekly ☐ 3) Monthly ☐ 4) Annually ☐ 5) Other ☐

Eye

16. Have you ever had the back of your eyes (the retina) examined? (not including examination by an optician or optometrist just for glasses) 1) Yes ☐ 2) No ☐ 3) cannot recall ☐

If yes who conducted the eye examination? 1) A general practitioner ☐ 2) A diabetes specialist ☐ 3) An eye specialist ☐ 4) Cannot recall ☐

17. Have you had laser treatment for your eyes? 1) Yes ☐ 2) No ☐

18. Have you ever had a foot problem? 1) Yes ☐ 2) No ☐ **If yes, do you suffer from any of the following – (you can tick more than one)** 1) Numbness or tingling ☐ 2) Burning or pain in feet ☐ 3) Foot ulcer ☐ 4) Swelling of the legs, ankles, feet ☐ 5) Other ☐

19. Please fill in the appropriate box if you carry out any of the following type of exercise : a) walking for 10-30 minutes every day ☐ b) walking twice or three times a week for 10-30 minutes ☐ c) attending a gym for up to 30 minutes a day ☐ d) attending a gym for a session of up to 30 minutes a week ☐ e) swimming twice or more a week for 10-30 minutes ☐ f) other form of exercise ☐ please state

Circulation

20. Have you ever had heart problems? 1) Yes ☐ 2) No ☐ 3) I don't know ☐

If yes, is it 1) Chest pain ☐ 2) Heart attack ☐ 3) Other ☐

Kidney

21. Have you ever been told by the diabetic physician you have kidney disease?

1) Yes ☐ 2) No ☐

22. Have you been diagnosed by a diabetic clinic as having protein in your urine?

1) Yes ☐ 2) No ☐ 3) I don't know ☐

23. If yes did you transfer from diabetic physician to nephrologists?

1) Yes ☐ 2) No ☐ 3) I don't know ☐

24. Have you been told what caused your kidney disease? 1) Yes ☐ 2) No ☐ 3) I don't know ☐ If yes, is it due to a) diabetes ☐ b) high blood pressure ☐ c) kidney stone ☐ d) medications ☐ e) others ☐

25. What tests does the clinic carry out to diagnose that you have kidney disease on you whilst you were there? a) Blood test ☐ b) Protein in urine ☐ c) Nothing ☐ d) I don't know ☐ e) other ☐

26. How long has it been since you were first diagnosed with kidney disease? (Circle one) a) 1 year ☐ b) 1-3 years ☐ c) 3-5 years ☐ d) 5-10 years ☐ e) other ☐

27. What type of kidney disease do you have ? a) Acute ☐ b) Chronic ☐ c) I don't know ☐

28. Do you know what is the stage of your kidney disease? 1) Yes ☐ 2) No ☐ If yes is it :
a. Stage 1- slight kidney damage with normal or increased filtration ☐ b. Stage 2- mild decrease in kidney function ☐ c. Stage 3- moderate decrease in kidney function ☐ d. Stage 4- severe decrease in kidney function ☐ e. Stage 5- kidney failure ☐

29. Do you have any symptoms due to kidney disease ? a) Change in urination patterns ☐ b) swelling ☐ c) skin rash / itching ☐ d) coma ☐ e) nausea and vomiting ☐ f) shortness of breath ☐ g) fatigue ☐ h) Other ☐

.....

30. Does kidney disease affect your daily life? 1) Yes ☐ 2) No ☐. If yes, can you give an example : a) does it affect your diet? ☐ b) does it affect your work? ☐ c) does it affect your social life? ☐ d. other ☐

31. Do you have a family history of kidney disease? 1) Yes ☐ 2) No ☐ . If yes please give the family member who suffered the condition

32. Do you know what food you should avoid if your kidneys are not behaving in a normal way ? 1) Yes ☐ 2) No ☐ and if yes is it a) **Salt** ☐ b) **Potassium** ☐- **you can tick more than one** - is it (bananas☐, oranges☐, tomatoes☐, dried fruits☐ and vegetables☐, milk☐, chocolate☐, nuts and seeds☐ and dairy products☐. Low potassium foods include apples☐, berries☐, watermelon☐, fresh beans☐, lettuce☐, cucumbers☐, onions☐ and vanilla-flavored desserts☐ c) **phosphorus- you can tick more than one- is it** (Cola☐, peanut butter ☐and nuts☐, liver☐, broccoli ☐ and dairy☐ are all high in phosphorus. d) **Protein -you can tick more than one- is it** (Egg☐, meat☐, milk☐ e) any **other**-food you should avoid?

Dialysis

33. If you are having renal dialysis what are the risks from this type of treatment? a) bleeding from access point ☐ b) hypotension ☐ c) infections ☐ d) anemia ☐ e) cramps, nausea and headaches ☐ f)infectious disease ☐ g) others ☐

34. Where do you receive the dialysis? a) home ☐ b) hospital ☐

35. How long does each dialysis take? a) 1 -3hr ☐ b) 4-6 hr ☐ c) 7-10 hr ☐ d. other ☐

36. How often you must go for the dialysis? a. every day b. twice a week c. three times a week d. Other

Kidney transplant

37. Have you had a kidney transplant? a) Yes ☐ b) No ☐ **If yes, what was the date of the transplant?**

38. Do you know what was the source of the transplant kidney? 1) Yes ☐ 2) No ☐
If yes, is it a) living related donors like parents, children or siblings ☐ b) living unrelated donor like friend or spouses ☐ c) altruistic donor ☐

39. Have you had get any of the following problems following the transplant; 1)Yes☐ 2) No ☐ if yes: a) High blood pressure ☐ b) Cardiovascular disease ☐ c) Presence of blood in the urine ☐ d) Hernia ☐ e) Kidney stones ☐ f) Other ☐

40. Do you know what treatment(s) are currently prescribed for you? 1)Yes ☐ 2) No ☐
If yes Is it (you can tick more than one) a. Cyclosporins (Neoral, Sandimmune, SangCya) ☐. b. Azathioprine (Imuran) ☐ c. Corticosteroids such as prednisolone (Deltasone, Orasone) ☐.

41. Are there any side effect(s) due to the medication(s)? 1)Yes ☐ 2) No ☐
If yes is it (you can tick more than one) a) puffiness of face ☐ b) increase in weight ☐ c) high blood sugar and blood pressure ☐ d) bone disease ☐ e) cataracts ☐ f) stomach acidity ☐ g) skin changes ☐ h) acne ☐ i) facial hair ☐ j) other ☐

Anemia

42. Have you ever been told you were anemic? 1)Yes ☐ 2) No ☐. If yes, how long ago were you first diagnosed? a) Less than 1 year ☐ b) 1-3 years ☐ c) 3-5 years ☐ d) more than 5 years ☐ f) other ☐

43. Have you taken medication to prevent anemia? 1)Yes ☐ 2) No ☐ 3) I don't know ☐

If yes, is it a) Folic acid ☐ b) Iron ☐ c) other ☐

Bone disease

44. Have you ever been told you had weak bones? 1) Yes ☐ 2) No ☐. If yes, when were you had weak bones? a) Less than 1 year ☐ b) 1-3 years ☐ c) 3-5 years ☐ d) more than 5 years ☐ f) other ☐

45. Do you take medication for your bones? 1) Yes ☐ 2) No ☐. If yes, is it a) calcium ☐ b) vitamin D ☐ c) combination of vitamin D and calcium ☐

Please provide use with comments or other feedback regarding your condition, so that it may be used in medical research.

Thank you again for your participation, it is highly appreciated.

For additional communication please contact:

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Appendix 4

Physicians Questionnaires

Questions which were designed as points of discussion with ophthalmologist.

1. How often do you think that the diabetic patients' eyes should be checked?
 2. What do you think is the best strategy to ensure that the treatment reduce the value of proliferative retinopathy
 3. How long does it take for the first diagnosis of retinopathy to progress to blindness?
 4. Have you ever seen a diabetic patient with a severe eye problem due to not being referred at the onset of the ocular problems.
-

Questions which were designed as points of discussion with nephrologists

1. What in your clinical experience are the major causes of kidney disease ?
 2. What are the most common kidney tests which should be done?
 3. How often the patient should be tested?
 4. How does the patient know if they have poor renal function?
 5. Have you ever seen a diabetic patient with a final stage of a kidney disease due to not being referred at the onset of the renal problems?
-

Appendix 5

Physicians interview for the UK

1) What is the most common diabetic complication(s) that Kuwaiti patients present -with , in your unit?

2) Do you think that diabetic patients treatment in Kuwait could be enhanced?

Yes/ No If yes, what enhancements do you think could have been made.

3) Did you change the medication (s) of the diabetic patients after admission?

Yes No

If yes, was the most common reason for such a change

4) In your opinion what is the major reason(s) Kuwaiti patients come to the UK for treatment.

5) Do you have any comments to make regarding the treatment of Kuwaiti patients in the UK, so that it may be used in medical research?

Appendix 5 A

Interview Results for UK physicians.

UK physicians at Ascot. - Introductory comments.

Five structured interviews were conducted with consultant physicians in the Ascot Rehabilitation Centre, regarding topics relevant to diabetes and renal, providing evidence regarding the interactions between patients and physicians. This thereby served to establish any links between the findings from the Ascot Kuwaiti patients and their physicians. The questionnaire contained only five questions, open and closed questions were used and the study was carried out by face-to-face sessions.

What is the most common diabetic complication(s) that Kuwaiti patients present with, in your unit?

consultant	Consultant comments
1	Here, the respondent was provided with a variety of answers: a) kidney problem, b) heart problem, c) stroke, and d) impaired sensation (nerve complications).
2	Here, the respondent answered macro vascular disease.
3	Here, the respondent answered - chronic kidney disease.
4	Here, the respondent answered -stroke and eye problems.
5	Here, the respondent provided two answers: a) stroke due to diabetes, and b) neuropathy).

Do you think that diabetic patients' treatment in Kuwait could be enhanced?

Yes/ No If yes, what enhancements do you think could have been made?"

consultant	Consultant comments
1	"She responded "yes" – the lack of empathy of the primary car doctors in Kuwait was noted and they should listen to the patient issue(s) and the physician should be carrying out suitable tests such as HbA1c,

	kidney function test, cholesterol test and eye test to prevent any complication. She stressed that a very important enhancement could be to transfer the patients to a dietician as soon as possible after diagnosis. She found that in the patients she saw this had not occurred.
2	” He responded “yes” by screening their patients in systematic way, the physician should be carrying out suitable tests such as HbA1c, kidney function test and eye test to prevent any complications
3	” he responded “yes” by transferring patients to a dietician ,the physician should be carrying out suitable tests such as HbA1c, kidney function test and by patient education to be aware about diabetic complications and monitor their blood glucose level.
4	” he responded “yes” the physician should be carrying out suitable tests such as HbA1c, and monitors the blood glucose level.
5	”he responded “yes” by primary care doctors education ,better diagnosis and patient education

Did you change the medication (s) of the diabetic patients after admission? Yes/ No. If yes, was the most common reason for such a change?

consultant	Consultant comments
1	“Yes because it is not the most suitable medicine and by this medicine which was prescribed in Kuwait the blood sugar will not be controlled “
2	“Yes to improve glycemic control.”
3	“Yes to control blood glucose for example; change the short acting insulin to long acting insulin for a patient who was recumbent”
4	“Yes to improve and control diabetes and blood pressure.”
5	“Yes because it is not the suitable medicine and by this medicine which prescribed in Kuwait the blood sugar will not be controlled.”

In your opinion what are the major reason(s) Kuwaiti patients come to the UK for treatment?

consultant	Consultant comments
1	The response was “They don’t have the best treatment in Kuwait.”
2	The response was “there is no quality of care in Kuwait and they need more specialization and physicians need more education.”
3	The response was “there is no quality of care in Kuwait, the physicians need more education and there is no expertise.”
4	The response was “there is no quality of care in Kuwait.”
5	“They don’t have the best treatment in Kuwait.” They have severe complication due to diabetes which if it is treated from the beginning they will not have this complication

Do you have any comments to make regarding the treatment of Kuwaiti patients in the UK, so that it may be used in medical research?

consultant	Consultant comments
1	She responded that Patients should be properly checked as if the physician controls the glucose and the blood pressure, and carrying out all the proper test that will reduce the risk of complication(s) and he should treat each patient as one of his family . All the physicians know the Guidelines for the treatment of diabetes even if he is not consultant which they had studied in the medical school. So the physician should be encouraged to keep their education up to date and their work should be monitored by the MOH to ensure it is suitable. . In UK if the physicians did not do their work properly they can face the risk of removal of their license to practice so, the MOH in Kuwait could use a similar system and should remove the license from each physician who did not do his work well. The MOH should ask the patients if they are happy with their treatment(s).
2	He responded the physicians need more education and they should due the proper test such as HbA1c and they should follow the NICE

	<p>guideline. They should have empathy and listen to patient health problems. Patient should be educated about diabetic complications and how they monitor the blood glucose. They should be transferred to dietician. Patient association group that one of the patient spoke directly to MOH about the bad treatment(s) in Kuwait. If the patients are not treated well from the beginning that can lead to severe complication and the government will spend more money to treat their patients .The government should be aware that the citizens' health is their responsibility and if they treated correctly from the beginning the budget of treatment will be less. Any physician not doing his job properly should have his license removed.</p>
3	<p>He responded the physicians need more education and they should do the proper tests such as HbA1c and they should follow the NICE guidelines. For example the Kuwait Government employ of UK physician to train the physicians in Kuwait. There should be stricter laws, for example in the UK there are rules that for example if the physician caused a minor mistake he should more educate. If he caused a major problem he could have his license removed. The MOH should be responsible for monitoring their physicians working practices which the UK does after the findings of the Harold Frederick Shipman Inquiry.</p>
4	<p>He responded the physician need more education and they should due the proper test such as HbA1c and they should be aware that a medicine which is good for one patient may not good for the another so they should change the medicine if it is not suitable for the patient . There should be team of physicians to exchange the information about diabetes treatments. If the diabetes is treated well from the beginning it may lead to no/fewer diabetic complications. The MOH should monitor the physician working practices.</p>
5	<p>He responded “A patient should get proper checks, such as a physician should control the glucose and the blood pressure, and carry out all the proper tests that will reduce the risk of complications. A Patient should get education from the beginning of their disease by their</p>

	<p>physician who should give the patient enough time so that he can explain to the patient the complications of the disease and how the patient should monitor his blood glucose level. In UK the physician submits his CV which mentions how many courses he has taken and how many conferences he has attended in the current year and that should be happening in Kuwait.</p>
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Summary of the analysis of comments by physicians in UK.

Comments of consultants about their current experiences in treatments of diabetic patients with severe complications due to diabetes. Each physician made a number of comments which have been listed below.

Table 1 Comments of consultants.

Physicians number	1*	2*	3*	4*	5*	6*	7*	8*
1	+	+	+	+	+	+		+
2	+	+	+	+	+	+	+	+
3	+	+		+	+	+	+	+
4	+	+		+	+			+
5	+	+		+	+		+	+

Key: 1*Primary care doctors skill/education/empathy 2*HbA1c /kidney function test /eye test/cholesterol test 3* dietician 4*Change the medication 5*treatment 6* Diabetic guideline.7* patients education 8* Kuwaiti government/MOH.

From table 1major areas of concern were found for consultants, namely.

From Table 1 column 1.Primary care doctors need more education and the lack of empathy of the primary care doctors in Kuwait was noted and they should listen to the patient issue(s)- was highlighted by all consultants .**Comment: This is sport which physicians in Kuwait said.**

From Table 1 column 2. The primary care doctors should be carrying out suitable tests such as HbA1c, kidney function test, cholesterol test and eye test to prevent any complication.**Comment: This is sport which physicians in Kuwait said.**

From Table 1 column 3, 4&5.The medication of the patients was change in UK because it is not the suitable medicine and by this medicine which prescribed in Kuwait the blood sugar will not be controlled -was highlighted by all consultants.

Kuwaiti patients came to the UK for treatment because they don't have the best treatment in Kuwait and there is no quality of care in Kuwait. Very important enhancement could be to transfer the patients to a dietician as soon as possible after diagnosis-- was highlighted by 2 consultants .**Comment: This is sport which some patients said that there medication which prescribed by the primary doctor not suitable and they are not in weight managements also the evidence from their files shows that referral to dietician was not carried out. The physicians in Kuwait said that the treatment was inadequate which lead to severe complication .**

From Table 1 column6.Primary care doctors in Kuwait should follow the NICE guidelines -was highlighted by 3 consultants. **Comment: This is sport which physicians in Kuwait said.**

From Table 1 column7. Patient should get education from the beginning of their disease by their physician who should give the patient enough time so that he can explain to the patient the complications of the disease- was highlighted by 3 consultants . **Comment: This is sport which physicians in Kuwait and the majority of the patients said that the primary doctors do not have empathy and do not listen to patients issue.**

From Table 1column8. If the patients are not treated well from the beginning that can led to severe complication and the government/MOH will spend more money to treat their patients .The government should be aware that the citizens' health is their responsibility and if they treated correctly from the beginning the budget of treatment will be less. Any physician not doing his job properly should have his license removed. One physician said in UK the physician submits his CV which mentions how may courses he has taken and how many conferences he has attended in the current year and that should be happening in Kuwait.

UK physicians

UK practitioners associated with the Ascot Rehabilitation clinic view diabetic treatment in Kuwait as having a few problems based on the manner in which the patients were treated. Based on these concerns of the UK doctors, the primary care doctor in Kuwaiti should be encouraged to both know and follow the guidelines for

diabetes treatment even if they are not of consultant status. Kuwaiti physicians providing non-optimal care may reflect on the lack of a formal system requiring them to keep their diabetic knowledge up to date as happens in the UK.

"Good doctors make the care of their patients their first concern :they are competent, keep their knowledge and skills up to date ,establish and maintain good relationships with patients and colleagues, are honest and trustworthy, and act with integrity and within the law"(General Medical Council, 2009).

Many dietitians have limited knowledge about cultural food in the terms of religion and habitual choice. Dietitians and physicians should be aware of the traditional food choice and not only of the medical aspects of their patients' condition. So treatment with healthy diet should take into account patients culture of food and habitual choice as happens in UK (Thaker & Barton, 2012).In the Ascot centre the dieticians have a very good knowledge about traditional patient food which is a very important medical aspect which can led to positive improvements in a patient health.

The UK physicians, were worried that the overall quality of care in Kuwait diabetes is lower than they considered optimal. This may reflect the suggestion that some physicians were not specialized to treat diabetes. Also they seemed to carry out treatments without strict adherence to guidelines which perhaps is best summarized by one patient describing them as "reckless". In this study, two examples of this were found. One patient had to have toes on both feet leg amputated and in another due to a wrong diagnosis a patients had a cancer spread to all parts of the body.

A greater awareness of the physicians of the potential severity of the diabetic state may have saved the patients toes because in this case the patient's feet were initially treated by topical application of creams rather than considering the numbness and burning sensations were potentially more serious. The situation was made even more problematic because even after constant complaints by the patient that his condition was not improving the doctor never did any check-up but only gave the patient some more cream to apply. In the case of the tumor, topical application for the patient's pain and aching in his thigh was unsuccessful as it was later discovered that the thigh pain was in fact due to a tumor in his lower back and this was indicated by the pain in his leg.

In contrast to the UK based physicians, Kuwaiti diabetes treatment is not focused on patient centred care. Physicians in Kuwait need to be far more diabetic patient centred who generally require a very high level of care to avoid the complications of their condition. This could be easily addressed by them providing more information to their patients, which patients in this study said were never given to them during their treatment. Not unsurprisingly, patients lacked basic information to try and help them in their treatment of their condition. In patient centred care, the patient has the right to information on the kind of treatment they receive and the various tests conducted on them (Health.org,2014) One finding is of special concern in that the patients were not tested for their levels of HbA_{1c}, which are essential for all diabetic patients (Diabetes UK, 2015). Late diabetic diagnosis and uncontrolled blood sugar levels lead to more severe and more costly complications which could be prevented by regular management. The most common test the physician should carry out urine and blood test to prevent kidney complications due to type 2 diabetes. The management of diabetes and its complications causes greater expense affecting the budget of the individual and health service (Bilous & Donnelly, 2010). Further, the necessary tests such as those used to monitor kidney function so as to avoid progression to kidney failure should also be carried out for all patients. It should not be the case that some of the patients only heard about some of these tests in the private hospitals of Kuwait or other countries to which they had been sent to receive their treatments

These comments are also supported by the comments made by the nephrologists and ophthalmologists in Kuwait.

Appendix 6

Consent form verbal statements given to each patient

Please tick each box to agree with the statements

To explain the nature of the study ☐

To provide the chance to ask question about the study. ☐

I hope you understand that all information collected will be treated confidentially. ☐

I confirm that I am taking part in this study of my own free will ☐

I am free to withdraw from the study at any time and for any reason. ☐

If I withdraw from the study, then I may ask for my data to be removed. ☐

I agree to take part in this study. ☐

Participant code-----

Date-----

Appendix 7

Informed constants for Adult patients (21 years and above)

اقرار مستنير للمرض للبالغين (21 سنة فأكثر)

- ❖ يهدف هذا البحث الي التعرف على معلوماتك ونمط حياتك وطريقة تعاملك مع مرض السكر وخبراتك بخصوص التشخيص والمتابعة والعلاج ونمط حياتك اليومية ومعرفتك بتأثيرات السكر على حالتك الصحية وبصفة خاصة احتمالات تأثير السكر على الكلي والعين وعلى الاعصاب وعلى الدورة الدموية وذلك بهدف تطوير سياسات وبرتوكولات التوعية الصحية والإرشادات المقدمة للمريض
- ❖ ان المشاركة في هذا البحث اختيارية أو ليست اجبارية وفي حالة موافقتك على المشاركة في هذا البحث فإنه لا يتضمن اعطاء اي ادوية أو اجراء فحوصات طبية أو سحب عينات دم ومن حقك التحفظ على الاجابة على أي سؤال دون ابداء الاسباب ولن يتم كتابة اسمك أو ما قد يدل على شخصيتك في نتائج هذا البحث.
- ❖ في حالة الموافقة بتعهد الباحث بالمحافظة على الخصوصية وسرية المعلومات وعدم تداولها خارج اطار البحث وكذلك فإن مشاركتك بالبحث لن يترتب عليها اي تكاليف مالية من ناحيتك.
- ❖ في حالة عدم الموافقة لن يؤثر ذلك على حقك الكامل في تلقي الرعاية الصحية المقررة لك
- ❖ يرحب الباحث بالإجابة على اي اساله طوال فترة اجراء هذا البحث وقبل اعطاء الموافقة.
- ❖ في حالة موافقتك فإنه يحق لك الانسحاب من الدراسة في اي وقت دون ابداء الاسباب دون ان يؤثر على حقك الكامل يتلقى الرعاية الصحية المقررة لك
- ❖ يرحب الباحث على اجابة أو استفسار قبل اعطاء الموافقة وأثناء البحث

اسم -----

☐

ا وفق

اسم -----

☐

لا ا و افق

Appendix 8

Participant information sheet .An investigation into the treatment of diabetes in Kuwait.

This project is envisaged as being structures as an informal structural interview. This will informing the potential participants of the following information.

To the patient the following comments would be made.

My name is Eman Buhajeeh and I am a PhD research student at the University of Bradford in the UK. I would like you to take part in a research project I am undertaking about the treatment of diabetes in Kuwait. I will explain what the purpose of the project is and if you do not understand anything then please ask me for clarification.

Why have you been chosen?

This is a pilot project and you have been selected at random from those patients who are attending a regular diabetes clinic. This means you all have firsthand experience of the treatment of diabetes in Kuwait. It does not require you to do anything except give your views and experiences and requires no special training.

What is purpose of the project?

The purpose of this research is to determine what experiences patients have of their treatment of diabetes and this method is the best method to use as it asks people who are currently undergoing treatment here in Kuwait. Assessing your experience will provide us with information about the professional standard of care.

Do I have to participate?

- You are free to decide whether or not to participate.
- If you agree, I will give you this information sheet for you to keep, and if you agree to this suggestion your agreement will be taken as an agreement to take part in this study.
- If you do not agree, you are still free to change your mind at any time and without giving a reason.
- If you do withdraw at any time, then you may also ask for any data already collected to be destroyed, and we will do this for you.

➤ Who is conducting the investigation

The investigation will be carried out by me (Eman Buhajeeh), under the supervision of Prof Rattray and Dr I Naylor of the |University of Bradford. Please contact me supervisors if you have any questions E.A.A.Bu-Hajeeh@brad.ac.uk; This study has been reviewed by the University of Bradford ethics panel.

What will you have to do?

- You will be asked a series of question about your diabetes
- The questions will determine factors such as your age and the duration of your diabetes.
- You are expected to give the best answers you can to the questions asked
- During the interview notes may be made but no tape recording or other form of recording such as video will be used.
- The notes will be anonymous as you will be simply allocated a number.
- The whole process should take no more than 1 hour to complete.

What are the probable benefits?

- You will be helping us to develop this way diabetes is treated in Kuwait.

Are there any risks?

- No – it is a matter of only answering a number of questions.
- If you find the process to your dissatisfaction - you may stop at any point and withdraw from the study.
- No in terms of people reading specific answers from specific people - since all data is anonymous and so none of your answers can ever be traced back to you as an individual.

Will my response be kept confidential?

All responses will be strictly confidential. Your personal data will be destroyed when the final study has been completed and any papers published, which may be in about 3 years time. Anonymous questionnaires and interview transcripts may be kept indefinitely, but this will be reviewed after 5 years.

Can I withdraw from the investigation?

You may withdraw at any time and ask for your data to be destroyed. Please just ask me to do this .**Contact for further information** Eman Buhajeel PhD student, E.A.A.Bu-Hajeel@brad.ac.uk **The patient would at the end of the interview be sincerely thanked for their participation.**

Appendix 9

State Of Kuwait
Ministry Of Health
Asst. Undersecretary For Technical Affairs



دولة الكويت
وزارة الصحة
وكيل الوزارة المساعد للشؤون الفنية

التاريخ: ٢٠١٤/٦/٢٥
الرقم: ٨٨٩٣

السيد الفاضل / د. وكيل الوزارة المحترم

تحية طيبة وبعد،،،

الموضوع / تسهيل مهمة الباحثة / إيمان أحمد بو حافية وآخرون
(مبعوثة دكتوراه في الصيدلة بجامعة بروفورد بالمملكة المتحدة)
رقم البحث (٢٠١٤/١٤٢)

تحت عنوان :

" النوع الثاني لمرض السكري وتأثيره على الكلى "

" Diabetes in Kuwait – Current Patients experiences of their medical treatment with emphasis on renal and dietary concentrations as compared with guidelines used in the UK "

يرجى التفضل بالإحاطة بأنه وفقاً لتوصية اللجنة الدائمة لتنسيق البحوث الطبية والصحية المشكلة بموجب القرار الوزاري رقم ٢٠٧ لسنة ٢٠١٢ باجتماعها الخامس المنعقد يوم الثلاثاء ٢٥/٦/٢٠١٣ بشأن آلية البت في طلبات البحوث التي لا تتضمن إجراء فحوصات أو تدخلات أو إعطاء أدوية للمرضي وبدراسة طلب وبروتوكول البحث المقدم من الباحثة / إيمان أحمد بو حافية (مبعوثة دكتوراه في الصيدلة بجامعة بروفورد بالمملكة المتحدة) بتاريخ ٢٠١٤/٦/١٢ تحت عنوان :

" النوع الثاني لمرض السكري وتأثيره على الكلى "

" Diabetes in Kuwait – Current Patients experiences of their medical treatment with emphasis on renal and dietary concentrations as compared with guidelines used in the UK "

والذي يتم باستخدام استبيان لجمع المعلومات من المرضى البالغين (٢١ سنة فأكثر) الذين يعالجون بعيادات السكر بالمستشفيات وبمراكز الرعاية الصحية الأولية واستبيان آخر لجمع المعلومات من الأطباء المتخصصين بعلاج السكر وأطباء الكلى والعيون .

1

Nada

ل.م.ح.
١٠١٥/٢٠١٤



التاريخ :

الرقم :

وباستطلاع آراء الجهات ذات الصلة بموضوع البحث تنفيذاً للتعميم الصادر من السيد / وكيل الوزارة برقم ١٥٦ لسنة ٢٠١٢ بهذا الشأن فقد وردت الموافقة عليه من السيد / د. مدير إدارة الخدمات الصيدلانية بالكتاب الوارد برقم ٢١٤٨٠ بتاريخ ٢٠١٤/٦/٢٥.

لذلك فإننا نوصي بالموافقة على إجراء البحث مع التزام الباحثة بالمحافظة على حقوق المشاركين بالبحث بالخصوصية وسرية المعلومات وعدم تداولها خارج إطار البحث والحصول على الموافقة المستنيرة المسبقة من المشاركين (Informed Consent) باستخدام النموذج المعتمد لذلك .

برجاء التفضل بالاطلاع والتوجيه بما ترونه مناسباً نحو مخاطبة الجهات ذات الصلة بموضوع البحث (السادة / مدراء المناطق الصحية والمستشفيات والسيدة / د. مدير الإدارة المركزية للرعاية الصحية الأولية والسيد / د. مدير إدارة الخدمات الصيدلانية) بهذا الشأن للعمل على تسهيل مهمة الباحثة لإجراء الدراسة وفقاً للضوابط المنظمة لذلك .

السادة / مدراء المناطق الصحية المستشفيات
السيد / د. مدير الإدارة المركزية للرعاية الصحية الأولية
السيد / د. مدير إدارة الخدمات الصيدلانية
وتفضلوا بقبول فائق الاحترام،،،
جمال منصور الحربي

الدكتور / جمال منصور الحربي
الوكيل المساعد للشئون الفنية
رئيس اللجنة الدائمة لتنسيق البحوث الطبية والصحية
وزارة الصحة

جمال منصور الحربي
وكيل وزارة الصحة
المساعد للشئون الفنية
2

Nada

لرئ
٢٥
السيد / د. مدير الإدارة المركزية للرعاية الصحية الأولية
السيد / د. مدير إدارة الخدمات الصيدلانية

Appendix 10

Cross tabulation of the antihypertensive medications taken by male and female Kuwaiti subjects who took part in this study.

Drug Group	Male	Female	
Calcium channel blockers			
Norvasc (amlodipine)	1	2	3
Usually Twynsta but if not available takes			
Valsartan and Norvasc (amlodipine)	1	0	1
Total	2	2	4
Beta blockers			
Tenormin (atenolol)	0	1	1
Total	0	1	1
Angiotensin II receptor antagonists			
Co- Diovan (valsartan)	0	4	4
Micardis (telmisarten)	0	0	0
Total	0	4	4
ACE inhibitors			
Coversyl (perindopril)	1	1	2
Capoten (captopril)	0	0	0
Zestril (lisinopril)	3	3	6
Total	4	4	8
Combined preparations			
Tenormin (atenolol) +Norvasc (amlodipine)	0	1	1
Capoten (captopril) + Zestorectic (Lisinopril)	0	1	1
Capoten (captopril) + Norvasc (amlodipine)	1	0	1
Co-Diovan (valsartan/hydrocholorthiazide)	0	1	1
+ Isoptin (verapamil)			
Diovan (valsartan) + Norvasc (amlodipine)	0	1	1
Tenorectic (atenolol and chlorthalidone)	0	3	3
Tenorectic(atenolol+chlorthalidone) and	0	1	1

Zestril (lisinopril)			
Tenorectic(atenolol+chlorthalidone)	0	1	1
and Lasix (Furosemide)			
Tenormin (Atenolol) and Co-Diovan (valsartan	0	1	1
+ hydrocholorthiazide)			
Tenormin (atenolol) and Zestril (lisinopril)	0	1	1
Zestoretic (lisinopril) and Isoptin(verapamil)	1	0	1
Zestril (lisinopril) and Concor	1	0	1
Total	3	11	14
Total	9	22	31
Did not know which drug they were taking	3	9	12
No drugs being taken	12	7	19

For the non-Kuwaiti patients the results were:

Drug Group	Male	Female	
Calcium channel blockers			
Norvasc (amlodipine)	0	2	2
Adalat (nifedipine)	1	0	1
Total	1	2	3
Beta blockers			
Tenormin (atenolol)	1	1	2
Total	1	1	2
Angiotensin II receptor antagonists			
Co-Diovan (valsartan)	0	1	1
ACE inhibitors			
Capoten (captopril)	2	1	3
Zestril (lisinopril)	4	3	7
Total	6	4	10
Combined preparations			
Tenorectic (atenolol + chlorthalidone)	0	2	2
Zestoretic (lisinopril) + nifedipine)	0	3	3

Zestril (lisinopril) + Tenormin (atenolol)	0	1	1
Lasix (furosemide) + Zestorectic (lisinopril)	0	1	1
Total	0	7	7
Diuretic drug –Lasix (furosemide)	1	0	1
Total	9	14	
23			
Did not know which drug they were taking	5	1	6
No drugs being taken	9	9	18
Total	23	24	47

Appendix 11

Symptoms of Hyperglycemia

For Kuwaiti nationals

Symptoms	Male (n=22)	Female (n=36)	
Pain in the body and blurred vision	0	2	2
Cold/ sweating	8	3	11
Sweating and fatigue	2	4	6
Fatigue, shakiness and blurred vision	1	5	6
Fatigue, shakiness, blurred vision and	4	4	8
Increase in appetite			
Fatigue, shakiness and sleepiness	1	4	5
Fatigue, cold, shakiness and sweating	1	4	5
Heart palpitations and shakiness	2		2
Blurred vision and heart palpitations	0	2	2
Fatigue and abdominal itching	0	2	2
Unconsciousness	1	2	3
Shakiness, heart palpitations and poor	0	2	2
Concentration			
The blood glucose becomes 300mg/dl	2		2
Drowsiness and dry mouth	0	2	2

For non-Kuwaitis

Symptoms	Male (n=22)	Female (n=22)	
Pain in the body and blurred vision	2	1	3
Cold/ sweating	7	1	8
Sweating and fatigue	2	1	3

Fatigue, shakiness and blurred vision	-	4	4
Fatigue, shakiness, blurred vision and an l increase in appetite	0	2	2
Fatigue, shakiness and sleepiness	2	2	4
Fatigue, cold, shakiness and sweating	2	1	3
Heart palpitations and shakiness		1	1
Blurred vision and heart palpitations	2	1	3
Fatigue and abdominal itching	0	1	1
Unconsciousness	1	1	2
Shakiness, heart palpitations and poor Concentration	2	1	3
Poor concentration	1	0	1
Fatigue	0	2	2
Sweating, coldness and blurred vision	0	2	2
Hunger, shakiness			
Coldness and heart palpitations	1	1	2

Appendix 12

Poster from Desman Diabetes Institute

DIABETES AND NUTRITION

Healthy eating habits make a significant contribution to the success of your treatment.



4.1 Taking healthy food is the basis of treatment for people with type 2 diabetes. Overweight people should follow a healthy diet and exercise more actively.



4.2 A healthy lifestyle is important to prevent type 2 diabetes, exercise helps to reduce cholesterol levels, blood pressure and prevent diabetes complications.



4.3 It is important for people with diabetes who must monitor or keep track of the level of carbohydrates in certain foods. However, skip a meal. Eat at regular times over the day.

Carbohydrates

Fiber

Fats



4.4 Eat as few simple sugars as possible such as candy, honey or regular sugar. This limits your intake of carbohydrates over the entire day such as bread, pasta, grains and rice.



4.5 Fiber is healthy. It slows down the absorption of sugars and fats and prevents the heart and blood. Fiber is also important for good intestinal function and bowel movement. Vegetables and whole wheat products contain a lot of fiber.



4.6 Choose vegetables like carrots or legumes, cauliflower or artichokes when (a) the oil has saturated fat but no protein (butter or lard and tallow).

Proteins

Alcohol

Sugar



4.7 Alternate eating plant proteins (beans, lentils, soya, etc.) and animal proteins (fish, chicken and pork, beef).



4.8 It is better to avoid drinking alcohol. If you do this, be sure to drink and limit yourself. Drink with the meal or when it is full. Limit yourself to 1 glass of wine or 2 glasses of beer per day. Alcohol consumption is not recommended if you are overweight, because it contains a large amount of calories.



4.9 The more spooning, sweets are suitable for people with diabetes and unprocessed low glucose food.

Appendix 13

Table 1: Types of Diet and their Replacements

Food Group	Stay Away From	Replacements
1- Drinks	<ul style="list-style-type: none"> • Pepsi, Coke, • Canned Juices • Alcohol • Non Alcoholic Beer 	<ul style="list-style-type: none"> • Diet Pepsi, Diet Coke, • Natural juices, • Drinks that contains • Chemical sugars such as Aspartame or Saccharin • Tea and coffee at moderate amounts, replacement of traditional sugar with Aspartame or Saccharin.
2- Fruits, Vegetables and snacks	<ul style="list-style-type: none"> • Jam, • Cakes. • Chocolates. • Potato chips. • Avocado. • Salted olives. • Fried vegetables. 	<ul style="list-style-type: none"> • Boiled potatoes. • Lentils, • Peas • Legumes • Fresh canned fruits
Bakery and Grains.	<ul style="list-style-type: none"> • All bakery made from white flour such white bread and pastries • Different types of • Pasta 	<ul style="list-style-type: none"> • Whole Meal bread • Whole Meal pastries • Oats • Brown Rice
3- Soup	<ul style="list-style-type: none"> • Soup made with animal fat • Readymade soup • Soup in a cup(high sodium and preservatives) 	<ul style="list-style-type: none"> • Homemade soup • Lentil soup • Legumes Soup
4- Eggs, Milk and dairy products	<ul style="list-style-type: none"> • Full Cream Milk • Full cream dairy products such as cheese and yoghurt 	<ul style="list-style-type: none"> • Low fat milk • Skimmed milk • 3 egg yolks per week

	<ul style="list-style-type: none"> • Salted Butter • Egg Whites 	
5- Fish	<ul style="list-style-type: none"> • Shrimps • Crabs • Sea Shells 	<ul style="list-style-type: none"> • All other fish types • None fried • Tuna
6- Meat	<ul style="list-style-type: none"> • Fried meat • Corned beef • Chicken skin • Sausages 	<ul style="list-style-type: none"> • Chicken without skin • Rabbits meat
7- Fats	<ul style="list-style-type: none"> • All plant and animal fats (Poly-saturated fatty acids) 	<ul style="list-style-type: none"> • Sun flower and corn oil • Polyunsaturated Fatty Acids

Table 2: The Amount of Calories present in Arabic Appetizer- Kubbah and Stuffed vegetables- (per 100 grams serving)

#	Food Type	Calories
1	Dulmah – stuffed vine leaves with rice and minced meat	108
2	Stuffed eggplant or squash with rice and minced meat	215
3	Halabi Kubbah- Rice dough stuffed with minced meat	358
4	Potatoes Kubbah – potatoes stuffed with minced meat	230
5	Jerish Kubbah – Groats stuffed with minced meat	236
6	Lemon Kubbah- (Halabi Kubbah with rice, tomato and lemon sauce	298
7	Bulgur Kubbah- Bulgur stuffed with minced meat	234
8	Fried Kebab – Minced meat mixed with vegetables and covered with eggs	480
9	Meat loaf	253

Table 3: The Amount of Calories present in Arabic Cooked Rice (per 100 grams serving)

#	Food Type	Calories
1	Boiled Rice	102
2	Rice with Lentils	234
3	Rice with Bulgur	222
4	Rice with Carrots	147
5	Rice with Kidney Beans	236
6	Rice with Tomatoes	196
7	Rice Dessert	288
8	Rice Mash	76

**Table 4: The Amount of Calories present in Arabic Cooked vegetables
with meat broth or sauce (per 100 grams serving)**

#	Food Type	Calories
1	Okra Broth	74
2	Beans Broth	102
3	Tomato Broth	198
4	Eggplant Broth	78
5	Cabbage Broth	83
6	Zucchini Broth	108
7	Pumpkin Broth	246
8	Chickpeas Meat Broth	139
9	Spinach Broth	106
10	Potatoes Broth	250
11	Cheese Pasta Broth	287
12	Lentils Broth	99
13	Cabbage Broth	83
14	Turnips Broth	26
15	Boiled Kidney Beans	40

**Table 5: The Amount of Calories present in Arabic Fried
Vegetables with plant fats (per 100 grams serving)**

#	Food Type	Calories
1	Fried eggplant	256
2	Fried potatoes	471
3	Fried tomatoes	173
4	Fried meat balls	554
5	Fried sheep kidneys and liver	322

**Table 6: The Amount of Calories present in Arabic Soups Meat and
Chicken (per 100 grams serving)**

#	Food Type	Calories
1	Turnips Lemon Soup (Without Meat)	64
2	Rice Tomato Soup (without Meat)	123
3	Tomato Soup (without Meat)	95
4	Chicken Broth Soup	190
5	Meat Broth Soup	208
6	Vegetables Chicken Soup	264
7	Lentil Meat Soup	280

Table7: The Amount of Calories present in Arabic Desserts
(per 100 grams serving)

#	Food Type	Calories
1	Milk Pudding (Milk with Corn Flour)	221
2	Baked dates	234
3	Dates dessert	263
4	Baklava	435
5	Sweet Rice with Milk	65
6	Dumplings	458
7	Biscuits	342
8	Chocolates with Nuts	532

Green Salads: 50-70 Calories

Table 8: Sample Weekly Diet for a Diabetes Patient that Provides 800-1000 Calories Per Day

Day	Breakfast	Lunch	Dinner
Saturday	<ul style="list-style-type: none"> • 1 cup of Milk • Tea or coffee without sugar • 1 Boiled Egg 	<ul style="list-style-type: none"> • Lamp ribs Broth cooked freely 	<ul style="list-style-type: none"> • Meat Soup or any type of Soup • Salad • Fruits as indicated in the fruit section
Sunday	<ul style="list-style-type: none"> • 1/4 loaf of bread 	<ul style="list-style-type: none"> • Squash or eggplant broth • 10 table spoons of rice • Salad 	<ul style="list-style-type: none"> • Small piece of bread • 1 piece of cold meat or cheese • Fruits as indicated in the fruit section
Monday		<ul style="list-style-type: none"> • 100-150 grams of Tuna • 1 piece of whole meal bread • Salad with lemon and vinegar 	<ul style="list-style-type: none"> • Vegetable or lentil soup • 50 grams of boiled potatoes • Fruits as

			indicated in the fruit section
Tuesday		<ul style="list-style-type: none"> • Chicken without Skin • Salads • Fruits as indicated in the fruit section 	<ul style="list-style-type: none"> • Vegetable or lentil soup • Salads • Whole Meal Bread
Wednesday		<ul style="list-style-type: none"> • 1 piece of grilled fish • 100 grams of Tuna • Mashed potatoes • Salad 	<ul style="list-style-type: none"> • Pasta cooked with tomato sauce • 10-15 table spoons
Thursday		<ul style="list-style-type: none"> • Vegetable cooked with meat broth with rice • Fruits as indicated in the fruit section 	<ul style="list-style-type: none"> • Bakla Meat Broth • Whole Meal Bread
Friday		<ul style="list-style-type: none"> • Grilled meat • Salad 	<ul style="list-style-type: none"> • Low fat Cheese • Fruits as indicated in the fruit section

Fruits Section:

Fruits are considered very important to human body as they contain vitamins and fiber that helps in both the digestion and the secretion of food. The list of fruits that can be consumed safely by a diabetic are 1-2 oranges, 1-lemons, 2-figs, 1 piece of water melons.

Cooking Tips:

- All meats should be grilled and cannot be fried
- Use Whole Meal bread
- Use low fat or Skimmed Milk
- Use Saccharin or Aspartame

Food Type	% of Glucose increase in Blood Level
Sugar (Glucose)	100%
Honey-dates-mashed Potatoes	80-90 %
White Bread-White Rice-Turnips	70-79%
Whole Meal Bread-Bananas- raisins	60-69%
Pasta-oats-sucrose	50-59%

Appendix 14

Data sheet as suggested by Abona and Samhan (2006)

	Date												
Body temperature	8.00 am												
	12.00 pm												
	16.00 pm												
	21.00 pm												
Blood pressure	8.00 am												
	12.00 pm												
	16.00 pm												
	21.00 pm												
weight													
Volume of drinks													
Volume of urine													
Creatinine													
BUN													
White blood cells													
Hemoglobin													
potassium													
calcium													
phosphate													
Sugar level													
Level of Cyclosporine in blood													